AUTOMOTIVE INDUSTRIES

JUNE 15, 1953

AUTOMOTIVE and AVIATION MANUFACTURING
CIVILIAN AND DEFENSE
ENGINEERING • PRODUCTION • MANAGEMENT

In This Issue... **Hottest "500" at Indianapolis · · · Observations on Economy Run · · · Buick Completes V8 Tooling · · · Special Saws for Trimming Aircraft Parts · · · New Northrop Technique · · · Two British Diesels**

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A CHILTON PUBLICATION

Jet Aircraft Part Gets

40 BORIZING OPERATIONS

in 12 minutes

MAKING DIFFICULT JOBS easy is a Heald specialty. Here's a typical example.

Eight circular flanges on this jet-engine compressor frame require *five* individual borizing operations to very close tolerances. Yet with the Heald way-type Bore-Matic shown at the left, the entire job—including loading and unloading—takes only 12 minutes per part.

The number 3 size way leg unit, with rotary fixture mounted low on the base, simplifies loading of the heavy, awkward part. The rotary fixture is manually indexed and positioned by an air-operated locator pin with foot-valve control. Operations performed include chamfering, turning, facing, forming and blending two radii. Borizing operations at each of the eight positions are completely automatic.

Remember, when it comes to precision finishing, it pays to come to Heald.

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Surface Grinding Machines
and Bore-Matics

HEALD

THE HEALD MACHINE COMPANY

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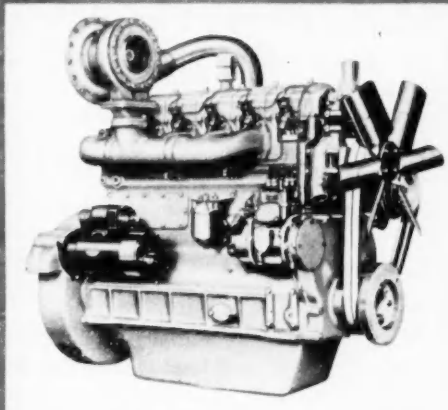
FAST SMOOTH POWERFUL

WAUKESHA 135 Series



135-DKBS—TURBOCHARGED DIESEL
Maximum hp 185 @ 2800 rpm.

426 and 451 cu. in. Diesel or Gasoline ENGINES 147 to 185 max. hp

212

• Versatile and rugged — Waukesha Model 135 Engines are ideal for almost any transport service in their speed and power range. The gasoline versions are 426 and 451 cubic inch displacement, with updraft or downdraft carburetion. The 135 Diesels are 426 cubic inch, either normal or turbocharged. Counterbalanced crankshafts, aluminum pistons, full pressure oiling—every modern feature! Exceptionally rugged, but smooth and lively, with no unnecessary weight. For medium speed and industrial service these engines are available with standard crankshafts. Send for bulletins.

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Incoloy

may be the alloy to use where corrosion and high temperatures are causing trouble

Incoloy
Preliminary Creep and Rupture Data
Condition: Course Grained-Annealed*

Creep

Temp. F	Stress, psi, to Produce a Minimum Creep Rate of: .01% 1000 hrs.	.10% 1000 hrs.
1400	4400	5500
1600	2000	2900
1800	250	500
2000		200**

Rupture

Temp. F	Stress, psi, to Produce Rupture in: 1000 hrs.	10,000 hrs.	100,000 hrs.
1400	8700	6000	(4200)
1600	3800	2200	(1300)
1800	1700	1100	(670)
2000	850	(540)	

*2 hrs. 2050 F AC
**.07% 1000 hrs. (4000 hrs.)

Incoloy® was developed as a companion to Inconel®, long considered one of industry's most durable high temperature metals.

Extensive laboratory and field tests indicate that Incoloy gives a particularly good account of itself under corrosive high-temperature conditions – conditions, for example, such as you find every day in the exhaust systems of heavy-duty, gasoline-powered trucks.

Like Inconel, the new alloy offers good strength at elevated temperatures up to 1800° F., and good resistance to oxidation. Yet Incoloy, having a lower nickel content, is likely to provide greater resistance to sulfur attack. It may, for this reason, prove an even better choice than Inconel for certain special purposes.

In structure, Incoloy is stably austenitic, and shows no tendency to become embrittled by precipitation of sigma or carbidic phases after prolonged exposure to intermediate temperatures.

Note also, in the tables (left), the important preliminary creep and rupture data which have been developed on Incoloy.

Like Inconel, the new alloy is readily workable, both hot and cold. Its rate of work hardening is practically the same as that of Inconel. And Incoloy can be welded by commonly-used methods.

All of the usual mill forms are produced – billets, rounds, flat, hexagons, sheet and strip, rods, tubing and wire. Consult your distributor of Inco Nickel Alloys for the latest information on availability from warehouse and mill. And remember – it usually helps to anticipate your requirements well in advance.

Remember, too, that you can always call on Inco's High Temperature Engineering Service for assistance in selecting the *right* metal for any high temperature application. All you need do is write and ask for a copy of the "High Temperature Worksheet." This is a simplified form especially designed to help you highlight the essential facts of your particular problem. The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

Inco Nickel Alloys

Incoloy...*for Heat-Resisting Applications*

A CHILTON MAGAZINE AI PUBLISHED SEMI-MONTHLY

AUTOMOTIVE INDUSTRIES

JUNE 15, 1953 VOL. 108, NO. 12

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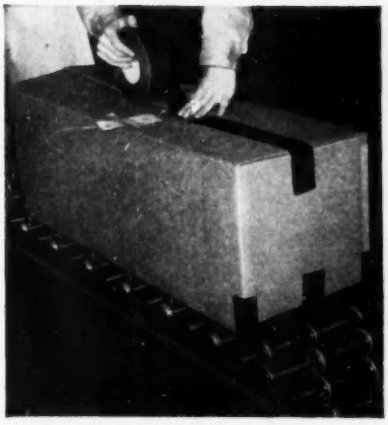
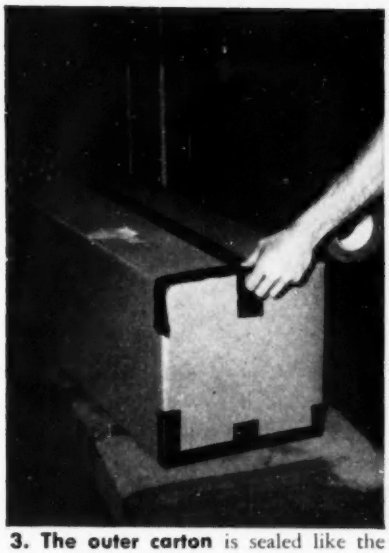
How Stewart-Warner makes ONE TAPE do the WORK OF TWO



1. A packaged South Wind heater for the Army is sealed with waterproof Polyken Tape No. 215.

2. The carton is then bagged in an aluminum foil-lined sack from which the air is removed. This bag is placed in a slightly larger carton.



3. The outer carton is sealed like the inner one with Polyken Tape No. 215.

4. Spare parts get the same government-approved treatment.

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Stewart-Warner Corp. formerly used *two* different tapes to seal inner and outer cartons containing South Wind automotive and aircraft heaters for military and civilian use.

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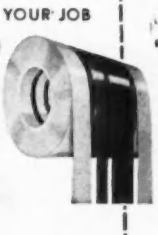

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WITH NEW HEAVY-DUTY

UNITED Air Cleaner

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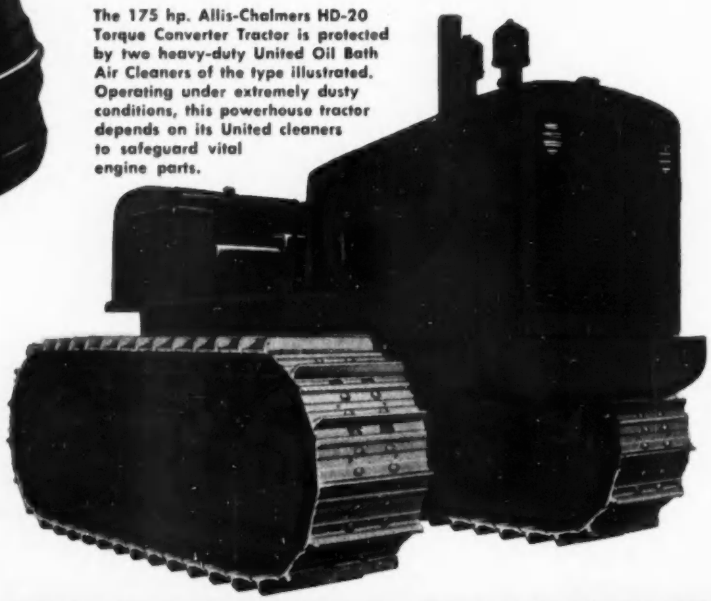
Under test conditions far more severe than are encountered during average working conditions, this new United Oil Bath Air Cleaner removed over 98.6 percent of harmful dust and abrasives from air entering engine.

United air cleaner engineers working closely with customers' technicians are constantly providing new, improved air cleaner designs for a wide variety of internal combustion engines.



The 175 hp. Allis-Chalmers HD-20 Torque Converter Tractor is protected by two heavy-duty United Oil Bath Air Cleaners of the type illustrated. Operating under extremely dusty conditions, this powerhouse tractor depends on its United cleaners to safeguard vital engine parts.

Exploded view showing new air cleaner with removable filter elements. These easily removable discs can be taken out, serviced and replaced with a minimum of effort and time.

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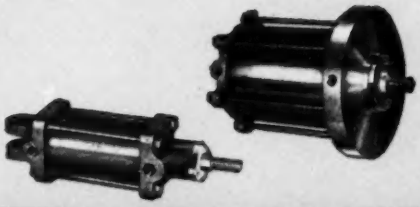
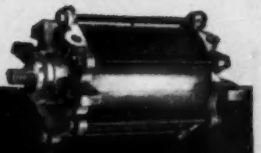


Pneumatic Cylinders



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- Fewer Parts to Stock
- Maximum Interchangeability
- No Springs in Main Valve

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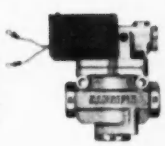

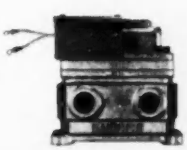

4-Way Valves.

Two 3-way valves mounted in compact, common body. Two piston poppets. Two cartridges. ⅜", ½", ¾" I.P.S.

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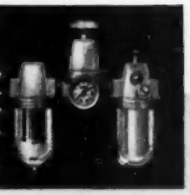
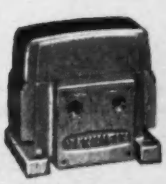


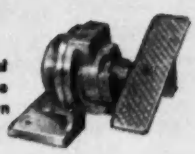
Disc Type Air Control Valves

Designed for smooth, positive and accurate control of air-operated equipment. Bronze discs lapped to perfect seal with seats. Packless design. For hand, foot or electrical operation. Sizes: ⅛" to 1¼" I.P.S.

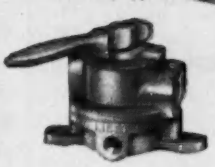
Write for Bulletin 57-W



Hannifin "Directair" electrically controlled air-operated disc valve



Foot-operated treadle valve (Also spring return and rotary types)



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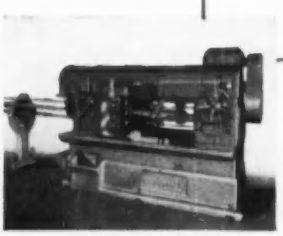
For full particulars please consult your Cone Representative or inquire direct.

MATERIAL—EVERDURE: (96% copper, 3% silicon, 1% manganese) Hole drilled with 17/32" drill to 1½" depth; thread rolling of ½" pipe thread.

	HSS	CARBIDE
Cycle Time	35 secs.	15 secs.
Work Spindle Speed	420 R.P.M. at 124 S.F.	850 R.P.M. at 250 S.F.
Tool Wear	2000 pcs. per grind	5000 pcs. per grind

The CONOMATIC is the ONLY representative of Frame "A". The short, "weave-proof," upright members, secured between larger and heavier top bed and base, make possible the strongest type of bridged support to the tooling area and its "work and tool axis."



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High Spots of This Issue

★ Special Saws Used for Trimming Aircraft Parts

Output of both military and civilian aircraft at the big Glenn L. Martin Co. plant near Baltimore, Md., has been greatly eased by three ingenious saws. Set-ups of these special-purpose units and their functions are explained in detail here. See Page 32.

★ Hottest "500"—Men, Machines, Heat Vie at Indianapolis

At this year's 500-mile Indianapolis Race, Bill Vukovich was first across the finish line in his Fuel Injection Special. He and other drivers battled frightful heat as well as each other. A complete recapitulation of the race is given. Page 34.

★ Northrop Tooling Technique Reduces Aircraft Part Cost

In these days of high costs, any developments which help to pare expenses are welcome. Tooling engineers at Northrop Aircraft recently found a better and cheaper way to make a part for the F-89. This article tells how it was done. Page 40.

★ Materials Handling Sales Now Over Billion Dollar Mark

Most successful from every point of view was the huge Materials Handling Show held in Philadelphia recently. About 27,000 persons were drawn to the technical sessions and $10 million worth of exhibits. This report hits the highlights of the affair. Page 49.

★ Buick Completes Tooling for V-8

Already the subject of two previous articles on its vast facilities, the ultra-modern Buick V-8 engine plant is treated here again. This time the author covers the latest additions in the way of equipment and operations using the principles of automation. See Page 50.

★ 42 New Product Items And Other High Spots, Such As:

Flying without wings; observations on 1953 Economy Run; British Diesels; advanced tooling at Ryan Aeronautical; and multi-transformer welding presses.

Automotive and Aviation News, Page 17
Complete Table of Contents, Page 3

AUTOMOTIVE INDUSTRIES COVERS—
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
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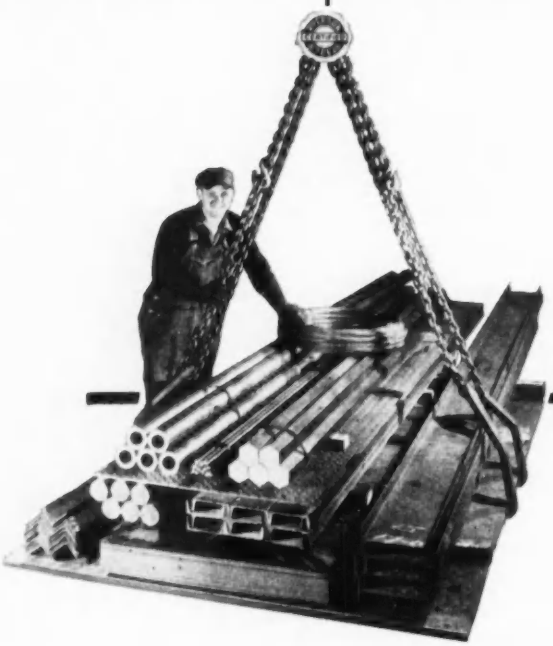

# of steel

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News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 108, No. 12 June 15, 1953

Ford to Buy Assets of Dearborn Motors

Ford Motor Co. has confirmed previous reports that it will take over most of the assets of Dearborn Motors Corp., established in 1946 to market the Ford tractor. The company announces that effective Aug. 1 the distribution arrangement with Dearborn Motors will be terminated, with Ford taking over distribution of the tractor and a broad line of farm implements and equipment.

Ford will buy the Dearborn Motors main office building and parts depot in Birmingham, Mich., and also will form a subsidiary to buy most of the assets of Wood Brothers, Inc., of Des Moines, Iowa, a Dearborn subsidiary which manufactures farm equipment. Dearborn Motors Credit Corp. will remain in business to finance sales of tractors, farm equipment and other products at the wholesale and retail levels. Most of the Dearborn Motors personnel, except those of the credit firm, will become associated with Ford at the time of the changeover.

Financial details of the transaction are extremely sketchy at the moment but more information is expected at the time of the actual transfer of assets. It is known that original stockholders in Dearborn Motors were Ford employees or members of the Ford family and earnings have been reported to be extremely high on the basis of the number of shares issued.

Aero Taxi

A taxicab version of the Aero Willys passenger car has just been announced by Willys Motors, Inc. Though competitively priced the model offers as standard equipment vinyl door panels and sponge rubber seats, heavy-duty springs, clutch and shocks; rear door pull-to cords; front and rear rubber floor mats; a sun visor on the driver's side, and a choice of any prime color currently released.

TIRELESS TUBES

Rollers drive against these experimental Goodyear one-ply five psi Rolligons, mounted on special axles. Transportation Corps is testing the device invented by W. H. Albee and built by West Coast Machinery, Inc.

K-F Drops Frazer Name; Now is Kaiser Motors

The Frazer influence has long been fading from Kaiser-Frazer Corp. and now even the Frazer name is to be scuttled. Stockholders of the company have voted to change the corporate name to Kaiser Motors Corp. Thus the last tangible identification of Joseph W. Frazer, who helped found the corporation in 1945, with the company has been eliminated. The Frazer car was dropped from the line two years ago. Mr. Frazer still has the title of board chairman and director.

Stockholders also voted to double the number of common shares authorized to 16 million from the present 8 million, and ratified a directors' option to Henry J. Kaiser Co. to buy 240,000 common shares at $8.25 a share by June 23, 1957. The attorney for a dissident stockholders committee opposed the several actions taken at the meeting and stated that K-F's liabilities had been increased by about $81 million as a result of its acquisition of Willys-Overland. Edgar F. Kaiser, president, reported that in the first quarter of this year the company would show a loss of about $3 million after deducting profits from defense work, but that this situation should not apply to operations the rest of this year.

The company has cut the price of its Henry J Corsair and Corsair deluxe models $100 and $125 respectively. F.O.B. price of the four-cyl Corsair now will be $1399, and of the six-cyl deluxe model $1561.18. The company says that the price cuts are principally due to lower costs for engines and other parts resulting from "recent acquisitions by Kaiser Motors."

Steel Pinch Improves Automobile Quality

An unexpected dividend for buyers of 1953 cars results from the steel shortage. Reason is that in order to keep production going, higher grades of steel than necessary are being used in many parts at a cost penalty because lower grades which would be adequate are not available.

News of the AUTOMOTIVE

United Press

LIGHTWEIGHT INTERCITY BUS

This German NW rear engined Diesel express bus features independent suspension on all wheels, low center of gravity through unitized body and frame. Ross steering. Weight of the 33 passenger bus is 8800 lb.

Court to Rule on T-H Coverage of Dealers

Whether or not retail automobile dealers who get their cars from a plant within their own state and sell their products locally are covered by the Taft-Hartley Act will be decided by the U. S. Supreme Court. The high tribunal has agreed to review a decision from the lower courts upholding an NLRB contention that such dealers are in interstate commerce, and consequently under the jurisdiction of Taft-Hartley. The specific case involved covers a California Chevrolet dealer cited by the Labor Board for refusing to bargain with the union. The board held that his contract with General Motors made him an integral part of a nationwide distributing system and consequently within the scope of interstate commerce. The decision is expected to be a particularly significant one, because if the lower court ruling is upheld labor union activity at dealerships can be greatly increased.

From all indications there will be little if any change in the Taft-Hartley law this year and possibly none next year. The industry has been interested in proposals advanced by both labor and management in Washington but at the present moment it appears that Congress is little inclined either to tighten or liberalize disputed sections of the Act. Consensus is that both sides are beginning to feel that perhaps the present law would be better as it is rather than to be revised in accordance with some of the proposed changes.

Harvester Takes Part of Bucyrus-Erie Line

Under an agreement with Bucyrus-Erie Co., International Harvester will take over sales, distribution, service and eventual manufacture of the Ohio company's industrial tractor equipment. Under the newly concluded arrangement Bucyrus-Erie will continue to supply Harvester industrial power distributors directly with allied tractor equipment until the end of this year. Beginning next Jan. 1, Harvester will take over sales, distribution, and servicing of Bucyrus-Erie equipment, purchasing its requirements from the Ohio firm up to its full capacity to produce such equipment and reselling it to Harvester distributors. Bucyrus-Erie gradually will discontinue production of its present line of tractor equipment, with manufacture being taken over by Harvester.

Air Conditioner Sales Surprise Dodge Chiefs

Extent of demand for air conditioning on Dodge is surprising factory officials. The cost of $642.60 as an optional cooling unit could account for about 20 per cent of the price of the car. Orders run into the hundreds, not a big percentage, but still surprising in the Dodge price class. One reason may be that buyers elect to take a Dodge with air conditioning in preference to a higher priced car without it.

FTC Ruling Expected on Dealer Coercion

Car factory officials are not exhibiting any undue alarm about an expected ruling by FTC against Harley-Davidson Motorcycle Co., charging coercion of dealers to force handling of Harley-Davidson vehicles and parts exclusively. Current car factory franchises are not specifically exclusive in regard to either cars or parts although the companies can legally require dealers to stock factory parts as part of the franchise agreement in order to insure service for their products. There has been some opinion that FTC might investigate factory dealer relationships in respect to amount of pressure exerted by field forces to influence handling of factory made parts, but so far there has been nothing to indicate such action. However, factory officials are aware that FTC might decide to look into activities of field personnel.

Automatic Drive for Chrysler

Production of its new fully automatic torque converter transmission has begun at Indianapolis, Chrysler Corp. announced. Output was 800 per week and was expected to rise to 1400 shortly. The 214-lb unit has two planetary gear sets. Price and availability had not been determined at press time.

Packard announced its air conditioning system as optional factory installed equipment. Weighing 200 lb, the unit in tests reduced the temperature of a car in a 120F test cell to a constant 68F in 12 minutes.

AND AVIATION INDUSTRIES

GMC, Reo Get More Army Truck Orders

GMC Truck & Coach Div. of General Motors and Reo Motors have received sizable additions to their defense contracts for military trucks. GMC had the largest increase, totaling more than $78.2 million for trucks and parts. The Reo order totaled in excess of $61.8 million for trucks, spare parts and engines. The new contract raises Reo's military orders to about $153 million. Other recent defense orders in the automotive industry include Ford, $11.2 million for tank engines; Continental $9.96 million for tank engines and parts; Buick, $3.44 million for tank transmissions; Oldsmobile, $1.14 million for a secret item; Chrysler, $500,000 for a classified contract and Kelsey-Hayes, $1.4 million for shells and classified items.

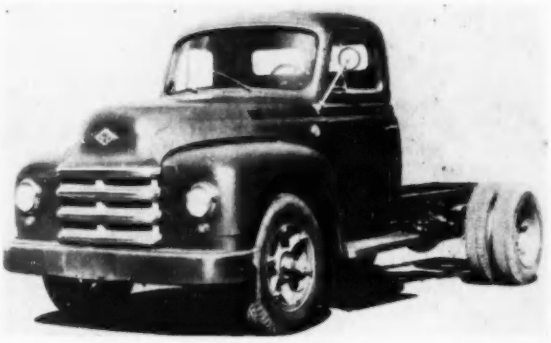
GM President Hits Reuther Criticism

Harlow H. Curtice, president of General Motors, has taken issue with a charge by Walter Reuther, president of CIO, that the automobile industry is concentrating 60 per cent of its 1953 scheduled production into the first half of the year. At General Motors' annual meeting he pointed out that the industry must build the cars at the time the public is willing to buy them and that currently GM sales are keeping pace with daily production. He said further that his company's factory sales are at a level 20 per cent above the monthly average for the first quarter of this year and that GM's production for the first half will exceed that of the similar period in 1950, which was then highest on record.

Exhaust Gas Danger Worse in Open Car

An insurance company investigation has turned up the surprising conclusion that danger of carbon monoxide poisoning from a faulty exhaust system is greater when the car windows are open than when they are closed if the car is in motion. The Association of Casualty and Insurance Companies which presented data gathered by California authorities, says that suction created by the car's movement would draw into the car through the open windows carbon monoxide gas escaping from a leak in the rear section of the exhaust system. It says further that leaks at the rear of the automobile were principal factors in releasing exhaust gases. The tests indicated further that the amount of carbon monixide gas that would enter the driver's compartment had little relation to age, make, or model of the car.

ROUNDS OUT LINE



Model 323 is Diamond T's latest in 1½-ton field. Their 252 ohv engine of 113 hp is offered on six wheelbases. Warner synchromesh transmission is standard, with choice of Clark R-1000 or Eaton 1350 two-speed axle. Model 422 is heavier companion.

Wilson Explains Policy to Aviation Leaders

Representatives of the airframe and engine companies of the Aircraft Industries Association participated in a luncheon meeting at the Pentagon June 2 with Charles E. Wilson, Secretary of Defense, and members of his staff.

The purpose of the meeting was to inform industry members of the principal features of the Air Force aircraft procurement program for fiscal 1954 and of the underlying considerations which have established its pattern. Mr. Wilson specifically pointed out that the approach to this procurement problem had been premised on an assumed sustained period of national peril rather than upon a date or general period of time that any particular emergency might arise.

The most important features of the briefing were summarized as follows:

(a) No cancellations of combat type aircraft are involved in the program, but there will be some reductions in non-combat types.

(b) From the current outlook, there will be from 2½ to 3 years' backlogs of business on industry's books.

(c) The importance of reductions in lead time and inventory as factors which will improve efficiency and result in economy.

(d) The high emphasis which will be placed on research and development, even though funds in this category have been reduced below the Truman budget figures.

(e) The continuation of aircraft prototype projects which look to continued qualitative leadership.

(f) The vital importance of adherence to production schedules.

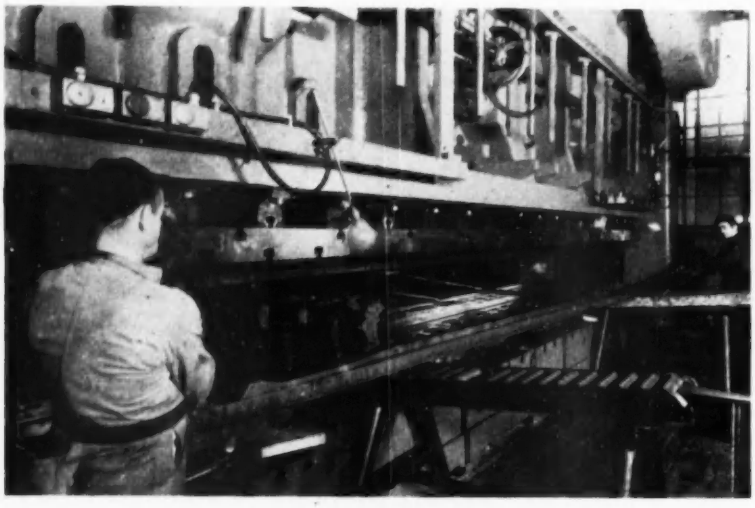
In connection with the foregoing, individual company representatives were given full details of their Air Force schedules. They were invited to appraise these and to suggest any revisions which might appear to be in order.

(*Turn to page* 148, *please*)

Ford Offers Loan of "500" Film

Ford is offering free booking of its 500-mile Indianapolis race film entitled "The Big Race." The 16 mm sound color film covers all facets of the Memorial Day spectacle, including the involved preparations, time trials, and the actual race itself. It is a compilation of the actual running of Memorial Day races of past years and is available from Ford Motor Co. film libraries at Dearborn, New York, and Richmond, Calif.

News of the AUTOMOTIVE



PRE-STRESSED PRESS

Frame side rails are made with virtually no deflection by Midland Steel Products Co. on this Hamilton 4000 ton mechanical press. Tie rods are cold stressed to the press capacity to control relative deflection between bed and slide. Six air cushions act together to prevent distortion when the side rail is ejected.

More States to Require Directional Signals

The trend toward compulsory installation of directional signals on vehicles is accelerating. Four states have already made it mandatory for new cars to be so equipped and another will join the ranks on July 1. In addition, five more states will require turn signals on new cars and trucks as compulsory equipment after the first of next year and two more will have such a law effective at the beginning of 1955. It is possible, however, that the industry itself will adopt turn indicators as standard equipment before that time. Several makes already have adopted this policy and the rest of the industry may go along within the next year or so. Such action was under active consideration last year but did not materialize when one of the large companies declined to go along with it.

Chrysler Lists Shares on Canadian Exchanges

Chrysler Corp. has listed its stock for trading on the Montreal and Toronto stock exchanges. The action marks the first time that Chrysler stock has been listed on any exchange outside of the United States. The company operates in Canada through a wholly-owned subsidiary, Chrysler Corp. of Canada, Ltd., which has offices and three plants at Windsor and parts warehouses in three other Canadian cities. Chrysler also has 1100 dealers in Canada and buys parts and services from 250 suppliers.

Nash Again Enters LeMans Road Race

Nash again will enter the LeMans Road Race to be held at LeMans, France, June 13 and 14. The company has entered two Nash-Healey sports cars equipped with the same type modified Ambassador engine which placed in the race for the past three consecutive years. Last year the Nash-Healey placed third in the overall classification.

Olds Marks Output

Oldsmobile has passed the four million mark in total car production since the company was founded in 1897. According to company records it took 38 years to produce the first million cars, but the second million was turned out in 5½ years, being completed on April 1, 1941. However, World War II upset the schedule so that it was nine years before the third million cars was completed in February of 1950. However, three of the nine years saw no production because of war work. The last million cars was turned out in about 3¼ years, shortest interval in history. Current production at Oldsmobile is at the highest level in history with the 137,070 cars built in the first four months, substantially ahead of the previous record of 125,516 units produced in the corresponding period of 1950.

Labor Contract Reopening May Set Precedent

Agreement between UAW-CIO and the Big Three automotive companies covering revision of five year contracts has pretty well established the pattern for the rest of the automobile industry. Five year contracts are practically universal among both manufacturers and suppliers and past experience indicates that settlement with one or two of the largest producers establishes a pattern for the entire industry.

It was not without significance to industry observers that harassing strikes at General Motors and Ford, which the union ostensibly could not resolve, were immediately terminated after the signing of the agreements with the two companies.

The union wasted no time in approaching the smaller independent automotive companies and suppliers and already has signed up some of them, including Nash, Briggs, Gemmer, Pachard, and Hudson. In general the agreements follow the established pattern, with some exceptions: Nash, for example, held out for a study committee to look into the question of higher pensions.

International Harvester, on the other hand, refused to have any part of the new agreement and notified

(*Turn to page* 150, *please*)

AND AVIATION INDUSTRIES

Metal Cleaning Ratings Studied by Wyandotte

Wyandotte Chemical Corp., a large supplier of cleaning agents to the automobile industry, is doing considerable research with radioactive materials in an attempt to establish a new series of cleanliness ratings. A long standing problem in plating metal parts is lack of standards of relative cleanliness and an objective of the Wyandotte work is to establish several ratings between the current "water break" test and absolute cleanliness. Test samples are first ground to present a freshly cleaned surface and then treated with a controlled quantity of radioactive acid. The specimen then is placed in a special apparatus equipped with a Geiger counter and the amount of radiation establishes the contamination factor.

Trailer Builders Show New Ideas

Truck trailer developments were announced by three manufacturers last month. Fruehauf showed an interstate model designed for a leasing concern to meet varying state requirements. The axles can be relocated along the frame rails, as they are held in place by tapered screw locking pins. In addition the king pin can be used in either of two positions by releasing a spring-loaded plunger. Fruehauf also announced it is re-entering the haulaway trailer field, establishing a new division at the home office. Trailers will be made at the Fort Wayne, Ind., plant and the first pilot model will be ready within 90 days.

Trailmobile received a production contract for an air-transportable van it developed to house an Air Force photographic laboratory. Empty weight of the trailer is about 7200 lb, including the detachable chassis weighing 2500 lb.

A refrigerated truck trailer with a structural plastic door and all-plastic corrugated lining has been developed by Strick. The reinforced plastic is said to be 40 per cent lighter than other materials, permitting up to 1000 lb greater load. Refrigerating equipment is said to run 75 per cent of the time formerly required.

BLAST VICTIM

Pictures just released show damage to a sedan with windows closed, caused by the Yucca Flats atomic blast in March. Top was severely dished, some windows were broken, hood was blown open, and the head of the dummy driver was crushed. The car was driven away.

Soviet Cars in Holland

The export of Russian automobiles to Holland is being started in June, according to a recent report from The Hague. The first hundred Moskvitch cars are expected at Amsterdam shortly, with Pobedas and Zims arriving later. The Dutch firm handling these Soviet automobiles has been negotiating for two years in order to establish itself as sales representative. Shipments of cars and motorcycles from the U. S. S. R. has now been made possible by a new Dutch-Soviet agreement.

It was also announced that the Russians will accept payment in Netherlands currency, a significant departure from their previous insistence on hard currency for their manufactured exports to the West. The U. S. S. R. is also selling cars in Sweden, and it is now understood that similar payments concessions have been extended to that country.

No More Ice

Disclosure of a thermal anti-icing system in the F-89D intercepter, which ducts hot air from the engine to various surfaces to prevent or remove ice formations, was made recently by Northrop Aircraft, Inc.

The system detects icing conditions and prevents formation of ice on the windshield, wing, empennage, wing tip rocket pods, engine air intake duct leading edge surfaces, and the engine forward frame compartments located in the engine air inlet ducts. No external attachments are used. Anti-icing of the windshield, fuel vents and other components is done by electrical resistance heating.

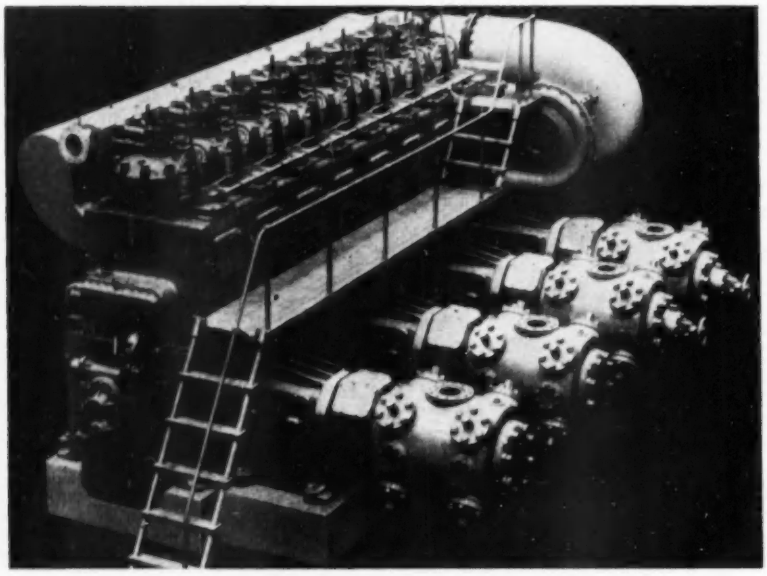
Sears May Abandon Sale of Allstate

Sears, Roebuck & Co. is considering giving up merchandising the Kaiser Motors-made Allstate car as an unsuccessful experiment. The company took on the Allstate in December, 1951, in 17 southern and southwestern cities but never actively promoted it as much as its regular merchandise. Sales of the car so far this year have been considerably behind the same period a year ago, which parallels K-F's experience with the Henry J. Sears sold 2000 Allstates last year.

Goodrich Sues Firestone over Tubeless Tire

A patent fight over design rights on tubeless tires is shaping up in the tire industry. B. F. Goodrich has filed suit in Federal Court in Cleveland charging Firestone with infringing certain patents on tubeless tires. Goodrich says that it offered to license the industry under its patents but that Firestone had declined the offer. For its part, Firestone says that its tubeless tires do not infringe any Goodrich patents. Any prolonged litigation might hold up acceptance by the automobile industry of tubeless tires as standard equipment, a move which has been under consideration and thought to be a near term possibility.

News of the AUTOMOTIVE



BLOWN TWO-CYCLE COMPRESSOR

Said to be the first successful attempt to turbocharge a two-cycle gas engine, this Clark Bros. 1320 hp compressor unit offers 50 per cent more power than comparable size unblown engines. Fuel consumption is lower, and 25 per cent less cooling water is needed. Exhaust driven turbine and compressor eliminate need for scavenging cylinders, and conform to load at all but start-up and light load.

New Stock Car Record

Jaguar Cars, Ltd., established new speed records for stock production cars recently near Jabbeke, Belgium. On a measured-mile course, a stock Jaguar XK-120M travelled 141.846 mph, exceeding the previous record set by a Jaguar in 1949 by more than ten mph. The Mark VII sports sedan, recently equipped with Borg-Warner automatic transmission, was officially clocked at 121.706 mph and the XK-120C, Jaguar's racing model, turned in a record 148.435 mph.

1953 MOTOR VEHICLE FACTORY SALES*

	Passenger Cars	Trucks	Buses	Totals 1953	Totals 1952
January	453,319	111,599	254	565,172	375,410
February	486,071	96,740	190	583,001	435,216
March	566,320	134,129	236	700,685	482,973
April	596,633	126,788	145	723,566	529,585
Total Four Months	2,102,343	469,256	825	2,572,424	1,823,184

1953 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	53,077	21,481	4,087	16,333	3,950	8,766	3,905	111,599
February	45,121	16,279	3,413	13,305	4,287	8,255	4,080	96,740
March	59,951	25,153	6,159	22,962	5,618	9,503	4,783	134,129
April	56,652	25,680	5,770	21,006	5,187	8,656	4,638	126,788
Total 4 Mos. 1953	213,801	90,593	19,429	73,605	19,042	35,380	17,406	469,256
Total 4 Mos. 1952	154,396	77,711	23,692	91,993	21,813	38,446	18,421	426,472

* Automobile Manufacturers Association.

Plant Changes Noted

A $75,000 expansion of existing engineering test facilities at the main plant of Harrison Radiator Div. at Lockport, N. Y., was announced recently.

Stanley Aviation Corp. is building a $100,000 addition to its plant near Buffalo. The expansion more than doubles the size of the largest unit in a group of five buildings the company leases. Area will be 50,000 sq ft when the addition is completed in July. Stanley Aviation also is making arrangements for the construction of a $500,000 plant in Denver, Colo.

Preliminary work has begun on the construction of a two-story addition to the rocket plant of the Bell Aircraft Corp. at Niagara Falls, N. Y. It will add 12,000 sq ft of working area to an existing 12,000 sq ft.

Caterpillar Tractor Co. announced it will build a $45 million manufacturing plant at an unnamed location. Scheduled for completion in 1955, the 700,000 sq ft plant will produce motor graders and tractors.

In Canada, a $500,000 fire levelled a Ford of Canada storage building and burned thousands of dollars worth of stock. The building was originally the motor plant for the firm, but has been used for storage of parts.

Standard Motor Co. of Canada announced that it planned to build a $400,000 parts depot and offices near Toronto, Ont., to handle its introduction to the Canadian market of an English sports car, the Triumph.

Noorduyn Back

The Canadian Car & Foundry Co. Ltd. announced it has sold all assets relating to manufacture of Norseman aircraft to a Montreal syndicate headed by R. B. C. Noorduyn.

Mr. Noorduyn, the original designer of the Norseman, retired in 1945 as vice-president and general manager of Noorduyn Aviation Ltd., the company which produced these aircraft from 1935 to 1946. Canadian Car & Foundry acquired rights and business when Noorduyn Aviation ceased operations early in 1946.

AND AVIATION INDUSTRIES

Three Flights Make History

A new transport plane described as the fastest piston-powered commercial airliner in the world made its maiden flight last month. It was the de luxe DC-7, first of a fleet built for American Airlines and scheduled for delivery to that airline later this year. Bearing a strong external resemblance to the DC-6 series of transports, the DC-7 is more than eight feet longer than the DC-6 and seats from 69 to 96 passengers. It is powered by four Wright R-3350 turbo-compound engines delivering 13,000 take-off hp.

Titanium is used for approximately 90 per cent of the engine nacelles and for engine firewalls, the first appreciable use of titanium in a commercial airplane. Also for the first time in any commercial airliner, a pilot will be able to decelerate quickly by dropping his main landing gear at top flying speed.

All existing distance and endurance records for jet aircraft have been broken by a Boeing B-47 Startojet bomber, the Air Force revealed. The new marks were established by a non-stop flight which covered slightly more than 12,000 miles in 24 hours through the use of aerial refueling.

The record flight, disclosed for the first time, was made last year. The flight was over the southern and western parts of the United States.

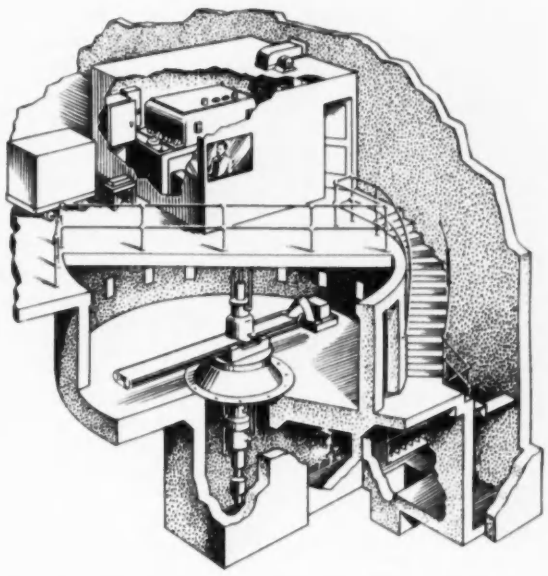
The announcement was made to members of the Aviation Writers Association after a tour of Carswell Air Force Base, and was one of the features of the Association's annual convention at Ft. Worth, Texas.

The six-jet, 185,000-lb B-47 was refueled three times during the flight by tanker aircraft. A dummy 10,000-lb bomb was dropped half way in flight.

A new world altitude record was set last month when a British Canberra bomber reached 63,668 ft. The Bristol Olympus engines, also specified for the Avro Vulcan delta-wing bomber, are made here by Curtiss-Wright as the J-67. They are known to be improved over the 9750 lb thrust output of 1950. The two-spool design —two independent compressors in series with separate turbines — reduces the tendency to surge, flow breakdown and flameout at altitude.

ACCELERATES TO 65 G'S

Much flight testing of guided missile components will be eliminated by use of this hydraulically-powered centrifuge. Rucker Co. is building two units to handle 600-lb loads up to six ft long. They will be installed at Convair and Bendix. A larger unit, with a 9000-lb capacity, is being developed.



Short Computer Course

The Wayne University Computation Laboratory offers a two-week summer program in computer applications and components Aug. 10-21 at Detroit. Daily lectures and laboratory work is planned for three different groups, covering business applications, engineering applications, and computer components. The fee is $75 for members of Wayne's participating firms, and $100 for others.

(*Turn to page* 154, *please*)

1953 U. S. PASSENGER CAR PRODUCTION

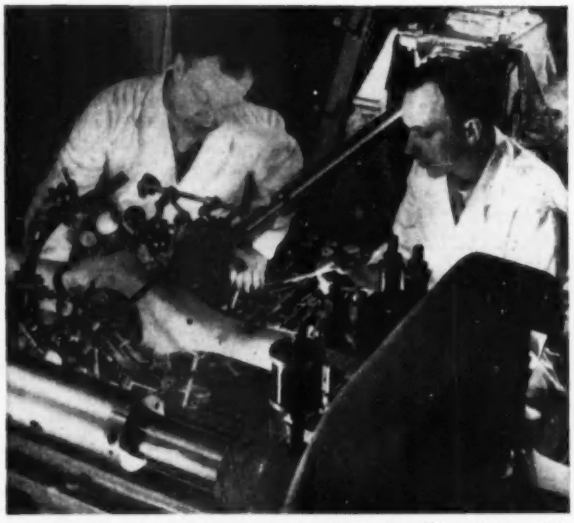
(As reported by the car factories)

	May 1953	April 1953	May 1952	Five Months 1953	Five Months 1952
Chrysler	15,136	16,748	11,734	82,221	55,342
De Soto	12,469	13,641	8,876	60,069	41,640
Dodge	27,784	30,832	22,441	148,738	108,759
Plymouth	56,367	57,280	43,458	274,382	201,045
Total—Chrysler Group	111,756	118,401	86,509	565,410	406,786
Ford	69,992	96,319	68,756	413,254	294,580
Lincoln	6,542	6,201	3,455	22,398	12,611
Mercury	17,318	23,234	15,699	103,316	70,716
Total—Ford Group	93,852	125,754	87,910	538,968	377,907
Buick	49,182	51,188	29,940	224,417	139,051
Cadillac	10,510	11,021	8,839	51,043	38,219
Chevrolet	139,474	139,573	81,696	629,599	380,159
Oldsmobile	36,550	35,467	21,101	158,570	98,131
Pontiac	42,789	42,539	25,256	185,611	117,191
Total—G. M. Group	278,505	297,791	166,832	1,250,040	772,751
Kaiser-Frazer Group	3,045	3,558	5,620	18,351	26,114
Hudson	8,290	11,540	5,490	44,885	35,905
Nash	17,017	21,258	17,068	92,256	50,929
Packard	9,783	10,106	5,985	50,762	27,719
Studebaker	22,329	24,465	13,830	82,787	76,060
Willys	2,070	6,313	4,805	24,442	22,816
Total—All Makes	546,647	619,186	394,039	2,667,901	1,798,087

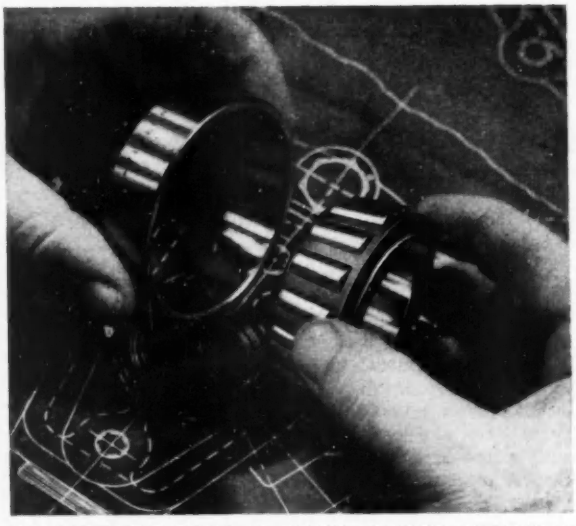
What's in a number?

ON ANY MAKE OF BEARING, THIS NUMBER—25877-25821—is enough to identify it as a tapered roller bearing commonly used on rear wheels. On a *Timken*® bearing it tells you even more. It tells you about quality and service too.

TO FIND STEEL GOOD ENOUGH for a Timken bearing we had to go into the steel business and make our own. Produced in our own mill in nine huge furnaces—three brand new, one the biggest in the world, all of them electric—Timken bearing steel is the finest made. We're the *only* bearing company in America that makes its own steel.



YOU GET FREE ENGINEERING HELP like this with Timken bearings. These transmission and axle deflection tests, staged in our own laboratory at our own expense, are helping car makers handle the added gear loads of higher horsepowers and automatic transmissions. We've also used such tests to show car makers how to use Timken bearings of smaller size, lower cost.



QUALITY AND SERVICE MAKE TIMKEN BEARINGS Number 1 for value where it counts most—in your car's moving parts, the "vital zone". When you're specifying a bearing number, be sure to specify "Timken" too. For *full* value, always use a Timken bearing cup with a Timken bearing cone. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN is number 1 for VALUE where value counts most: in the vital zone

TRADE MARK REG. U.S. PAT. OFF.

NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬭ AND THRUST →⬭← LOADS OR ANY COMBINATION →✳←

Men in the News

Minnesota Mining & Manufacturing Co. — Herbert P. Buetow was raised to the presidency of the firm, succeeding R. P. Carlton.

Detroit Diesel Engine Div.—John Forsyth has been appointed manager of the Wayne, Mich., plant.

Warner Electric Brake & Clutch Co.—Steven P. J. Wood has been elected president.

Cleveland Hardware and Forging Co. — Herbert E. White was elected president, succeeding A. J. Sanford who is now chairman.

Esso Standard Oil Co.—Donald W. Bedell is now special representative to the aviation industry.

Mather Spring Co. —Horace Y. Barnes is now director of sales.

Potter & Johnson Co.—**Gordon W. Smithson** is now chief engineer.

Stewart-Warner Corp. — Newly-elected vice-presidents include **James E. Burke**, v-p for foreign operation; **William W. Miller**, v-p for industrial relations and legal; Div. One director of engineering, **David C. Peterson**; Die Casting Div. general manager, **Lynn G. Vanderhoof**; U. S. Machine Div. general manager, **Carl J. Winkler**; and **Walter F. Herold**, formerly executive vice-president of Bassick Co. and now vice-president, engineering and corporate engineering representative on the East Coast. **William Pace** has been named advertising manager of the South Wind Div.

General Motors Corp.—**Glen R. Fitzgerald** has been appointed director of the process development section, succeeding **Semon E. Knudson** who is now assistant manufacturing manager of aircraft engine operations at Allison Div.

GMC Truck & Coach Div.—**Bernard W. Crandell** is now director of publicity.

Kaiser-Frazer Sales Corp.—**Roy Abernathy** was appointed vice-president and general sales manager. He had been assistant general sales manager of Packard.

Twin Coach Co.—**A. E. Brehm** is now service manager.

Briggs Mfg. Co.—Seven major changes raised **George W. Drysdale** to vice-president and assistant to the president, **Joseph D. Quinn** to vice-president in charge of manufacturing, **Fred W. Hofmann** to executive vice-president, **Walter B. Connolly** to vice-president in charge of labor relations, **A. D. Blackwood** to vice-president in charge of finance, **Daniel J. Convery** to treasurer, and **David B. Hinchman** to secretary.

Borg-Warner Corp. — **Frank W. Rickard** has joined the firm to fill the new position of director of manufacturing services.

Marshall-Eclipse Div., Bendix—**C. S. Ferguson** was named director of engineering.

Chrysler Corp.—**Frank W. Wylie** has been appointed manager of the traveling engineering show.

Lincoln-Mercury Div.—**O. F. Marsal** has been assigned to the Los Angeles assembly plant, trading places with **H. H. Keays**, who becomes Wayne, Mich., plant manager. **Paul F. Lorenz** was named controller of the division.

Chrysler Corp. of Canada—**Frank J. Hogan** was recently promoted to treasurer.

Pontiac Motor Div.—**Thomas E. Seavey** succeeds the late **Howard Phelps** as master mechanic.

Hyatt Bearings Div.—**Charles C. Wardell** was raised to advertising manager.

Fruehauf Trailer Co.—**Carl J. Koelsch** was elected a vice-president.

(*Turn to page* 166, *please*)

Necrology

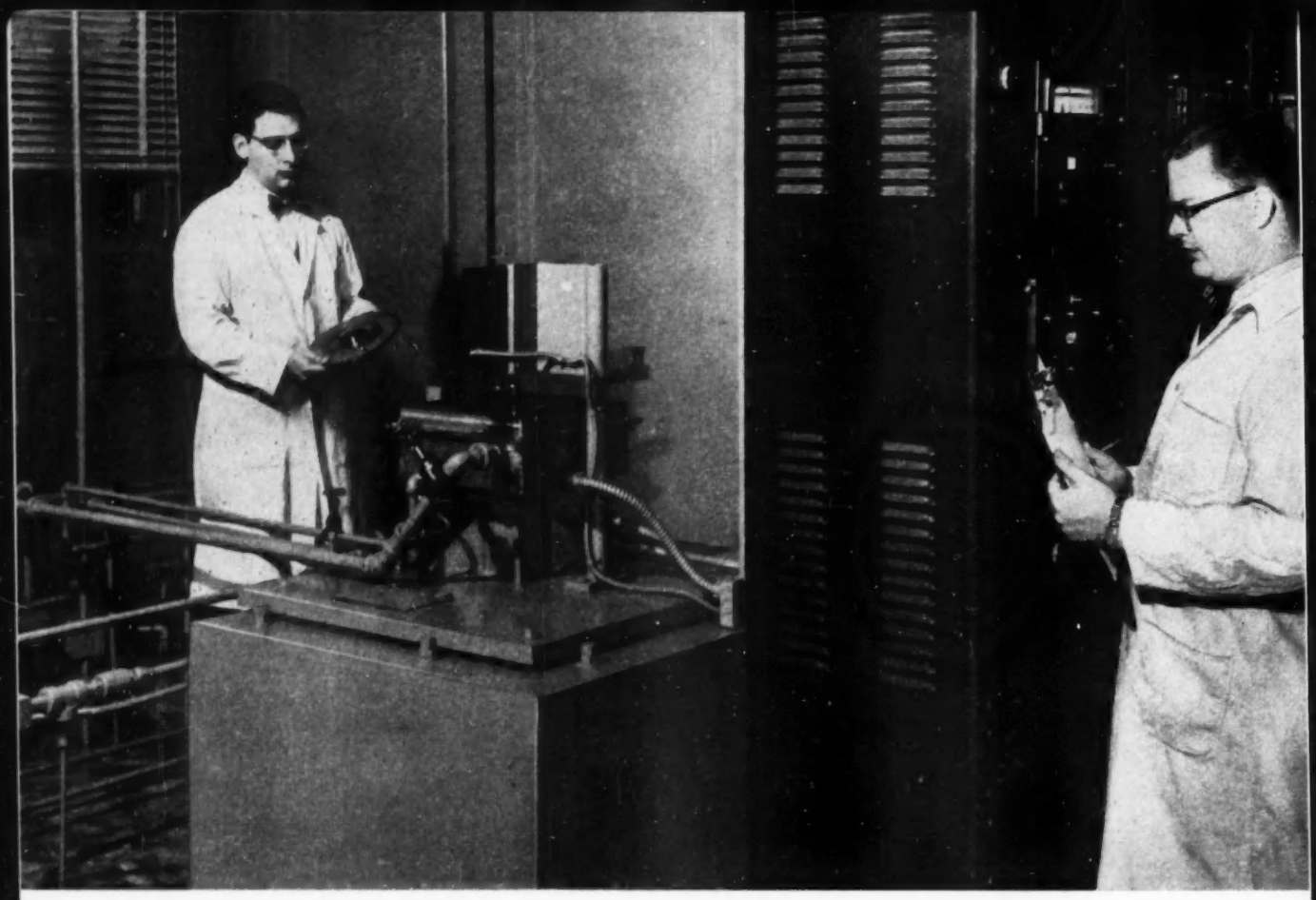
Herman Hanni, 59, a founder and retired general manager of the Scintilla Magneto Div. of Bendix Avilation Corp., died at Sidney, N. Y., on May 22.

Francis S. Denneen, 73, co-founder and secretary-treasurer of the Ohio Crankshaft Co., died on May 10.

L. D. Rigdon, 67, consultant to the Westinghouse Electric Corp., died at his home in Pittsburgh on May 24.

Edward C. Badeau, 58, in charge of the special publications section of the International Nickel Co., died on Staten Island, N. Y., on May 24.

Thomas O. Richards, 53, head of the executive engineering department of General Motors Research Laboratories Div., died at Detroit on May 17.



These men can help you find the right clutch facing...*faster*

Whether you're looking for facing materials to suit a new wet clutch design—or to improve the performance of an existing unit—the Armstrong men and equipment shown here are ready to save you time and trouble.

These men compound Armstrong's Friction Materials. They make your job easier by making it unnecessary for you to field test a random variety of possible facings.

It would be good, of course, if it were possible to look at a new clutch design and immediately select a facing with precisely the characteristics needed. Unfortunately, however, even minor design differences can create new and unpredictable facing problems.

Your first step, then, is to install a few likely Armstrong materials in experimental clutch units. These materials will be suggested by Armstrong on an "educated guess" basis after studying your design and your torque and engagement specifications. Since this guess is based on many years of compounding experience, these first materials probably will be very close to what you want.

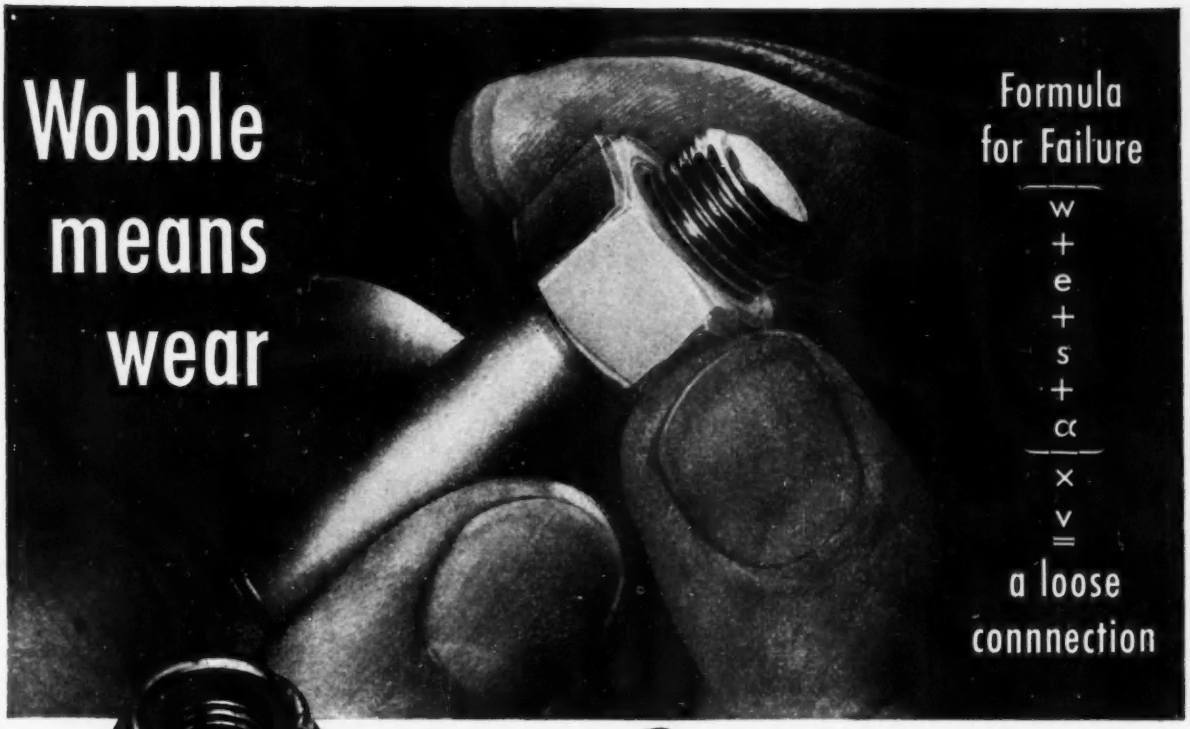
Nevertheless, once you have accumulated performance data on the suggested facings, Armstrong compounders compare your results with their laboratory data on these same materials. This comparison tells them what formulation modifications, if any, may be needed to meet your performance requirements.

These requirements can be correlated closely with material formulations because Armstrong's compounders know what performance differences result from widely varied changes in formulation or manufacturing method. They collect these data on a regular, orderly basis using the equipment shown above.

In their studies, hundreds of different materials are operated on this Armstrong-built test unit. The behavior of each material is plotted under standard, controlled conditions. This gives Armstrong's compounders a large library of data upon which to draw. That's why they usually can help you quickly with facing problems involving anything from a conventional wet clutch to the newest dream design.

Whatever your current facing problem may be, send us details about it. We'll be glad to call and go over your questions with you or, if you prefer, we'll suggest suitable materials for test. Write Armstrong Cork Company, Industrial Division, 7206 Imperial Avenue, Lancaster, Pennsylvania. Available for export.

ARMSTRONG'S FRICTION MATERIALS



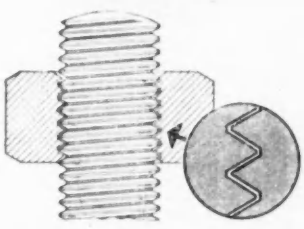
Elastic Stop nuts can't wobble

Formula for Failure—[(w) Initial thread wear + (e) bolt stretch + (s) thermal expansion or contraction + (α) wobble] × (v) vibration = a loose connection.

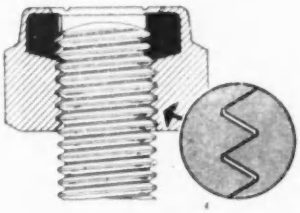
WOBBLE, permitted by normal axial thread play, and vibration are two of the major elements contributing to thread wear, loose connections and ultimate failure of a threaded fastener.

One device — the elastic locking insert — eliminates axial play and dampens destructive, wear-producing vibration. Because of the locking action of ESNA's famous red elastic collar, ELASTIC STOP nuts *do not loosen under vibration.*

Other important ESNA advantages include quick application and precise adjustment, reuseability, protection against liquid seepage, and uniform bolt loading. Mail our coupon for design information.



YOU CAN WOBBLE AN ORDINARY NUT AND BOLT with your fingers. This is the result of the tolerance spread permitted by the several classes of thread fit.



GRIPPING THE BOLT WITH A PERFECT FIT, ESNA's red elastic collar enforces a constant downward pressure that eliminates axial play, enforcing a positive contact between load-carrying sides of bolt and nut threads.

ELASTIC STOP NUT CORPORATION OF AMERICA
also maker of the ROLLPIN

Elastic Stop Nut Corporation of America
Dept. N36-65, 2330 Vauxhall Road, Union, N. J.
Please send the following free fastening information:

☐ ELASTIC STOP nut bulletin

☐ Here is a drawing of our product. What self-locking fastener would you suggest?

Name _____ Title _____

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HIGH TENSILE

ANCHOR

HIGH TEMPERATURE

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CLINCH

GANG CHANNEL

NYLON CAP

Only ESNA manufactures a complete line of all types and sizes of self-locking nuts

Alive with
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Complete Production and Engineering Facilities at each plant —
WALLACE BARNES COMPANY
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RAYMOND Manufacturing COMPANY
CORRY, PENNSYLVANIA
BARNES-GIBSON-RAYMOND
40300 PLYMOUTH RD. PLYMOUTH, MICH.
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DIVISIONS OF ASSOCIATED SPRING CORPORATION

Engineered Steering for Trucks

FORE-AFT AND CROSS STEER
Steering Gear Ahead of Axle

FORE-AFT AND CROSS STEER
with Intermediate Bellcrank

STEERING LINKAGE must be developed to meet the requirements of many different truck designs. Thompson's "Steering Engineers" have worked closely with truck builders for over 35 years to improve steering.

With the accent on easy steering, design advances, road speed and increased loads on the suspension and linkage; steering linkage units are required to provide more strength and accuracy and greater freedom of movement at the sockets.

Improvements in modern trucks—with many additional requirements set up by the manufacturer for military and other "off-the-road" vehicles such as four-wheel steer, etc., as well as standard commercial models—necessitated better and far more complicated steering units.

Illustrated are 2 of the types of steering linkage found on current-model trucks. The Detroit Division of Thompson Products has many other variations of steering units designed for truck use. We welcome the opportunity of submitting them for your examination. Please contact us.

YOU CAN COUNT ON . . .

Thompson Products, Inc.

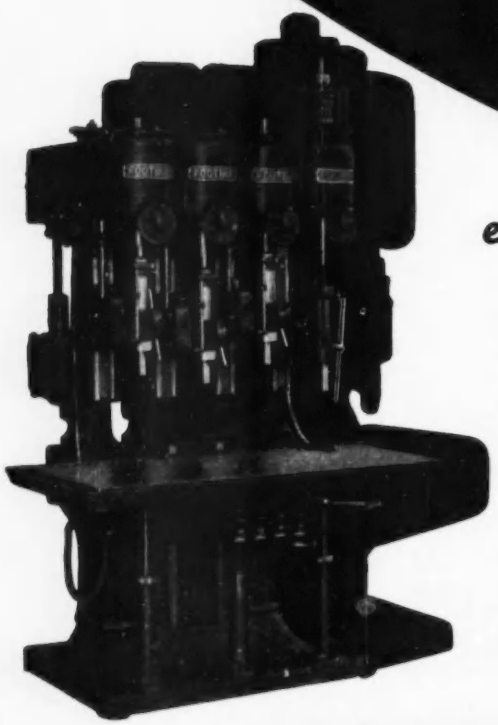
DETROIT DIVISION

7881 CONANT AVENUE • DETROIT 11, MICHIGAN

FOOTBURT

faster...

for tool room or assembly line



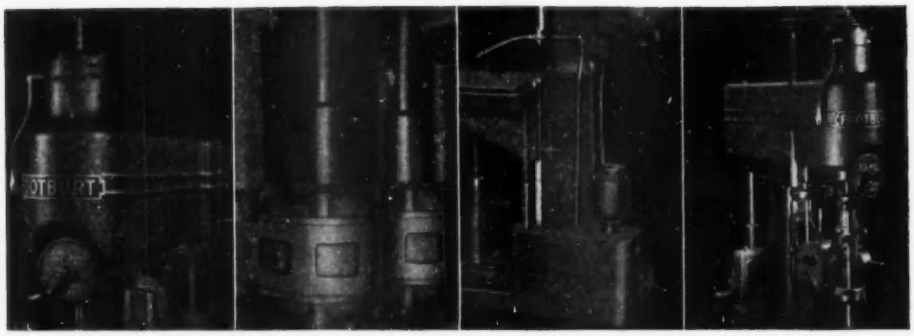
engineered for production

The choice of fine machine tools now will help you meet those new production schedules. Footburt Sensatives are built with the wide range of speeds and with power and sturdiness to drive cutting tools to their full capacity. They are built with the care and precision that will keep them accurate over a long period. Write, wire or phone for prices and delivery information.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building

No. 2 Machine with Back Gear • 12" Overhang • ⅝" Drilling Capacity in Steel • Optional Speed Ranges • 185 to 2300 RPM • 280 to 3450 RPM • Vertical Motor Drive with Standard Single Speed Motor • Power Feed Assembly • Tapping Attachment • Coolant Outfit.



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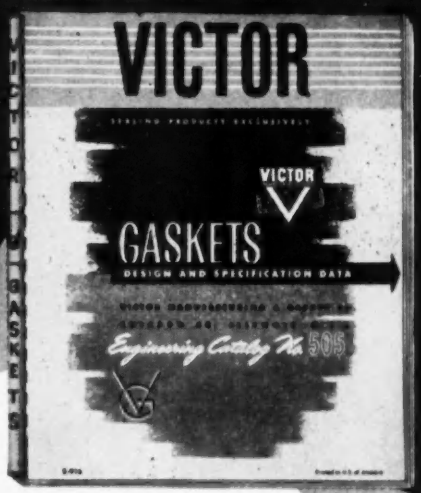
FOOTBURT

MACHINE TOOLS

New Complete Guide to Gasket Materials

meeting SAE-ASTM Specifications

For the Design Engineer *



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Section B — Victor Packings

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You will realize in this Catalog, a heretofore missing valuable service to design engineers. It equips you with current, complete, and precise technical information enabling a sound approach and solution to sealing problems requiring gasket materials. It tells what is available in the various standard materials. It is organized and edited for your convenient use, especially on new design work.

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This catalog is your key to Victor's storehouse of more than 40 years' experience in gasket development and manufacturing. It puts before you the most complete line in all current designs, and shows the way to most satisfactory fulfillment of your gasket specifications.

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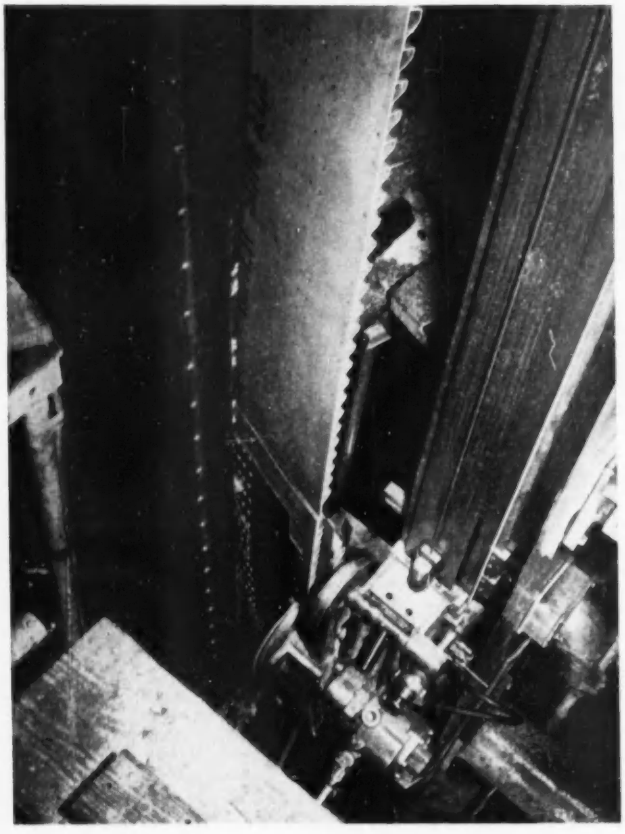
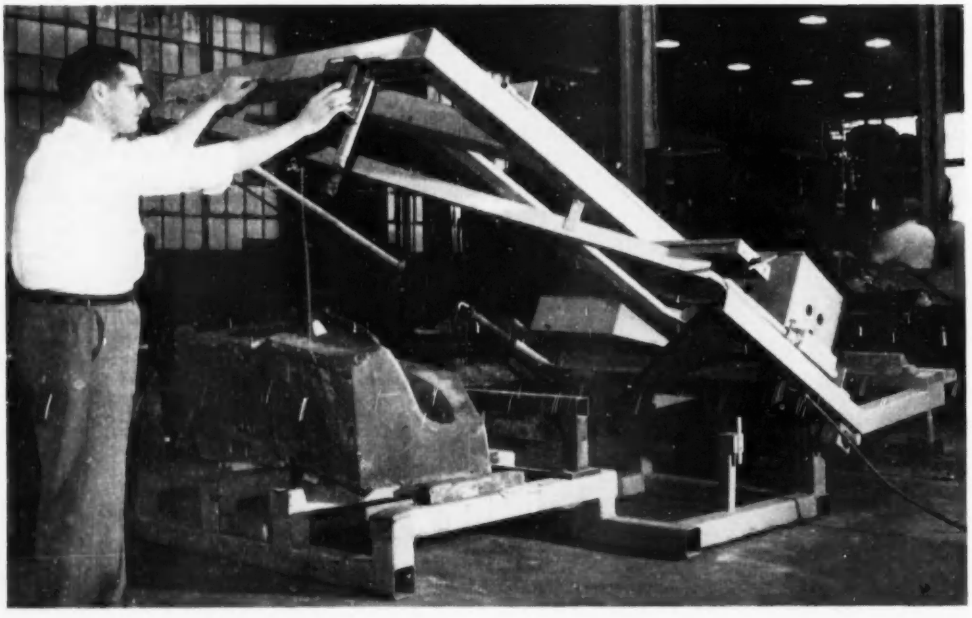
Special Saws Trimming



The wing blanket saw is shown near the end of its vertical travel. Note the cable which is used to feed the saw.

THREE cleverly devised saws have been developed which facilitate the production of military and civilian aircraft at the Glenn L. Martin plant outside of Baltimore, Md. One of these saws is utilized for trimming off the ends of the wing section wherever a splice occurs. Another special purpose saw is employed for contouring honeycomb material that is so widely used in the construction of current aircraft. The third is used to cut up obsolete lead and Kirksite dies for reprocessing.

The unique saw for trimming the wing section blanket is mounted on a dovetailed vertical way which, when in operation, is secured to the fixture containing the built-up wing section. The saw assembly is completely mobile and can be readily transferred from one fixture to another. Whenever a splice is encountered on an outer wing or center wing section, the special purpose saw is used to clean up the splice.



Specially designed saw used for cutting up obsolete Kirksite and lead dies into sizes more suitable for remelting.

Used for Aircraft Parts

By Raymond Kautz,
Senior Tool Layout Draftsman
The Glenn L. Martin Co.

A conventional woodworking circular saw blade is utilized in the wing blanket saw for cutting through the sheet aluminum wing panels and stiffener material. Either 24 ST or 75 ST aluminum alloy is used for the wing construction. A four-hp, air-operated motor is used to drive the circular saw at 5000 sfpm. The saw unit is fed automatically down the wing section at 18 ipm. This is done by means of a steel cable looped around two idler wheels, at each end of the vertical way, secured to the saw assembly at the center line of the way, and placed through a drive mechanism at the outside of the saw as shown in the illustration. The feed drive is powered by the air motor through a vee belt and pulleys.

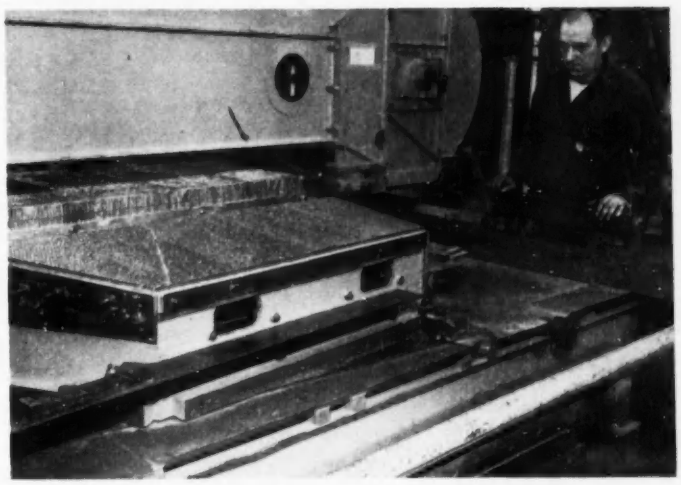
In conjunction with the blanket saw, a special portable mill has been developed by Martin tool engineers. The mill is used to face the sawed wing-edge. Mounted in the same fashion as the saw, the mill feeds down the wing at a rate of 24 ipm with the 12 in. diam milling cutter turning at 800 rpm. The cutter is driven by a one-hp electric motor and there is a separate ¼-hp reversing type electric motor for the feed.

There are several band-type saws set up in one production area that have been designed solely to contour aluminum honeycomb material. These saws are, in effect, horizontal band saws which contain an automatic feed attachment. The saw heads are portable and can be moved from one fixture to another with little setup time required. About 20 min is necessary for changing the saw head from one work-holding fixture to another.

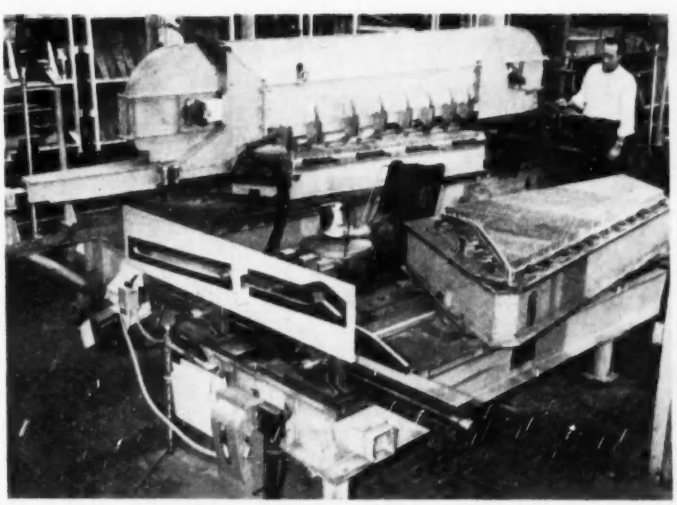
Honeycomb material is secured by means of a special frame made to the contour of the finished piece. The work is further secured by toggle-type, spring loaded roller hold-downs.

All saw cuts are made from the

(*Turn to page 92, please*)

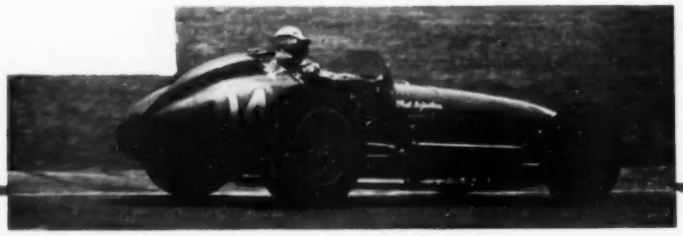


In this illustration, one piece of honeycomb has been cut and the saw is starting in on the next section.



The saw in operation is on a fixed pivot point which permits the saw head to swing vertically or horizontally about that point. A GE industrial vacuum cleaner has been installed to remove chips from the saw blade. The fixture in the foreground has been set up with a piece of honeycomb and the master template. A saw head will next be placed in position to contour the material.

HOTTEST "500"



The Vukovich car as it appeared to other contenders during most of the race—going away. Note inside wheels of car are almost precisely on white line. Scene is the northwest turn.

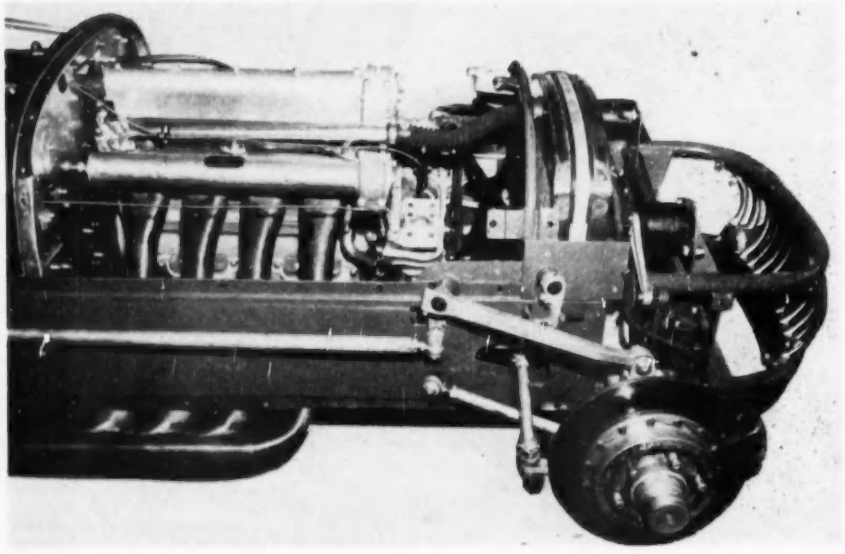
1953 Indianapolis Race Produces Sensational

BILL VUKOVICH, Fresno, Calif., go artist, won the 1953 Indianapolis 500 mile race at an average speed of 128.740 mph, triumphing handily in a three-way contest between, men, machines, and heat. Mere statistics cannot tell the story of the terrific struggle most of the contestants put up against high temperature and humidity which developed before the race had gone half way.

As this is written it is believed only four of the first 10 drivers to finish went all the way without relief. Vukovich, of course, went the route, as did Art Cross, who finished second. Elsewhere in the starting field relief drivers were in greater demand than for many a year and in some cases three and four drivers were used in a given car. Heat, and poor cockpit ventilation, accounted for most of the hospital casualties among name drivers, including Johnnie Parsons and Tony Bettenhausen.

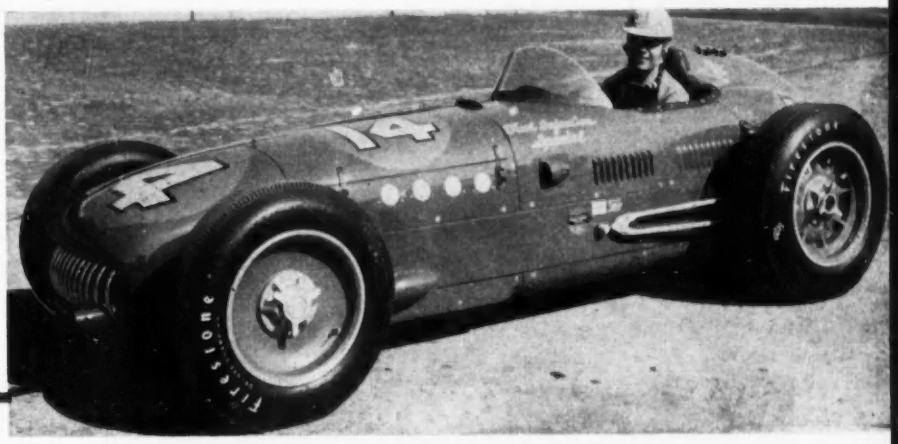
Carl Scarborough, of Clarkston, Mich., who started the race in the No. 73 McNamara Special, pulled into his pit in his 70th lap and collapsed while being helped from his car. He succumbed in the Speedway hospital after emergency measures, including oxygen and surgical means for heart massage, had been applied for more than an hour.

Scarborough was the only fatality in the 1953 race, although there were numerous spectacular crashes, the first of which occurred in the third lap when Andy Linden hit the wall and slid down into the infield. Jerry Hoyt had to go below the white line to avoid Linden, spining in the process. From



Structural details of the Fuel Injection Special driven by Bill Vukovich. Engine in this car is tilted 36 deg to right of vertical and crank-drive-line center is well to left side of the machine.

By
Robert T. Jackson
Perfect Circle Corp.



All photos by Robert T. Jackson except where noted

Winner and qualifying champ in Fuel Injection Special. His qualifying time was 4:20.13 for an average of 138.392 mph, which did not equal the 1952 record of 139.034 mph set by Chet Miller in Novi Pure Oil Special. His race time was 3:53:01.69, an average of 128.740 mph. (O'Dell-Shields photo)

Struggle Between Men, Machines and Heat

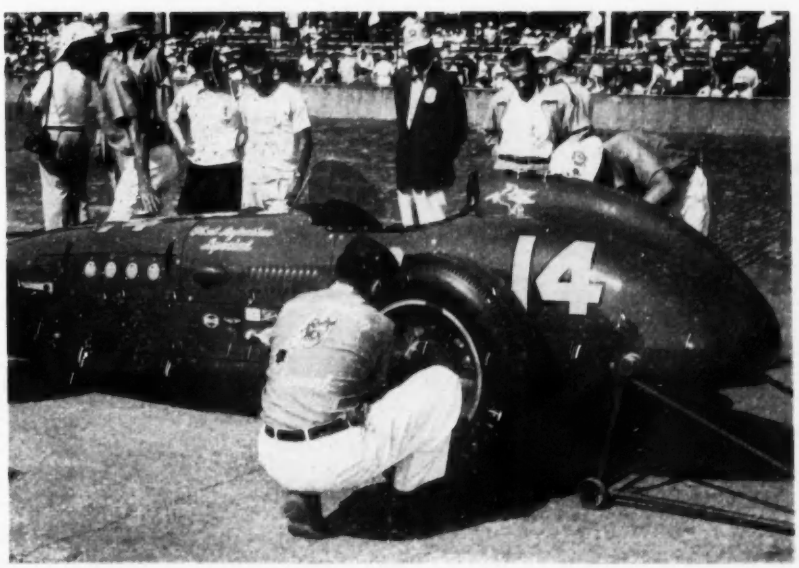
this time until the very last laps of the race crashes took toll of the field but there were no serious injuries.

Returning to the Vukovich victory, it is a real pleasure to record the statement that it was well-reserved in all respects. The car was excellently prepared by its crew and driven in masterful style by Vukovich. This reporter, departing from custom, spent some time observing the race from a couple of posts in the northwest turn. From these vantage points it was easy to see why Vukovich commanded the situation at all times—he simply passed 'em where he caught 'em, and always looked good while doing it. Those readers who may be well informed on the sport will appreciate the enormity of the ground covered by the above expression — it just isn't as simple as it sounds.

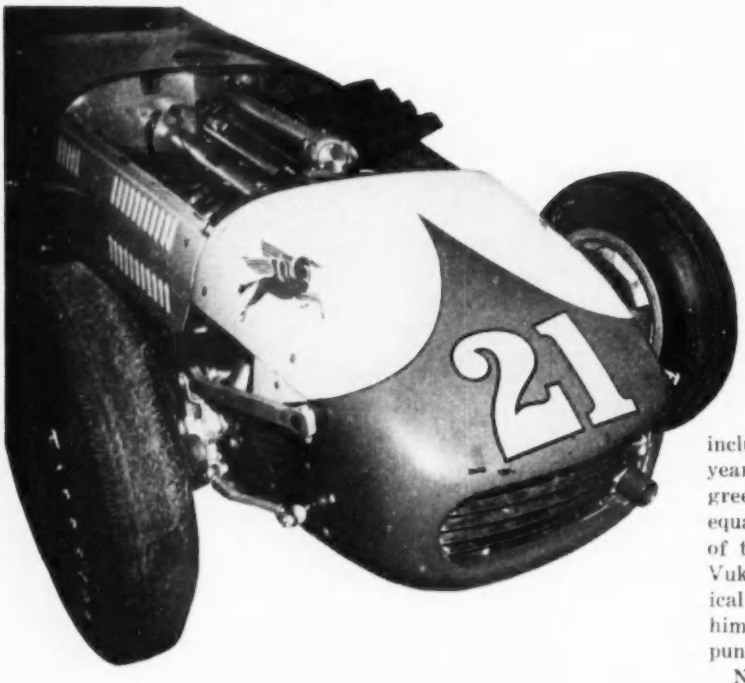
Competitively, Vukovich dominated the race throughout. He led all but five laps (49 through 53) and controlled the pace as he chose. From the first lap on he gained at will and usually was running well out in the breeze. In six or eight laps he had attained a lead of that many seconds which he progressively increased to two laps plus at the time of his third and last pit stop. All this he was doing while breaking records, mostly his own—set last year, as went along.

The Vukovich race story is a one man narrative. He *led* the race. He *won* the race. He *really* won the race. He was pushed but never pressed. The remainder of the field was having a race of its own but Vukovich, to tarnish again an old cliche, was running in a class by himself.

The Firestone people keep many interesting data,



The winning car gets its race rubber. Jim Travers (nearest camera) and Frank Coon, mechanics on Bill Vukovich's Fuel Injection Spl., installing the rear tires, on which the car started the race, about 9 a.m. on race day.



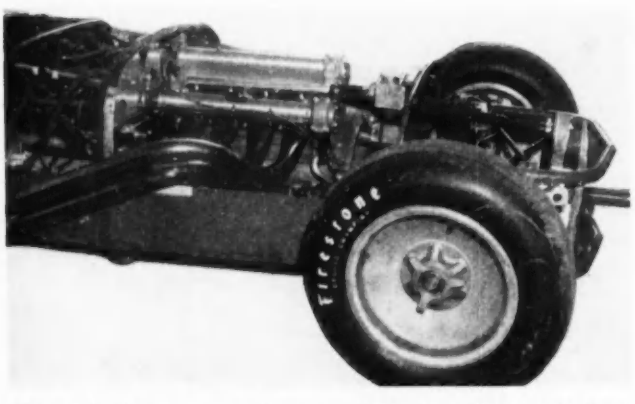
Johnnie Parsons' No. 21 Belond Equa-Flow Special (Kurtis-Kraft Type 500-B) has its engine inclined 36 deg to the right of vertical. Note that air horns for the fuel injector are carried to outside of hood line. This arrangement of the air horns for fuel injectors was used on numerous cars but others took air from inside the hood.

including track temperatures, from year to year. The 1953 track temperature of 130 degrees, as announced through Firestone, was equalled only once before within the memory of this observer—in 1929, I believe. So to Vukovich should also go laurels for the physical stamina and endurance which enabled him to continue his conquest in spite of the punishing heat.

Now for some dry, though interesting figures. Vukovich made *three* pit stops. Number one was made at 48 laps. The second came at 112. His third and last was made on his 171st lap. All *four* tires were changed, and fuel added, on *each* stop. The longest stop was, roundly put, one minute! The briefest was 48 seconds! For describing pit technique like that only superlatives should be used but we'll simply call it magnificent.

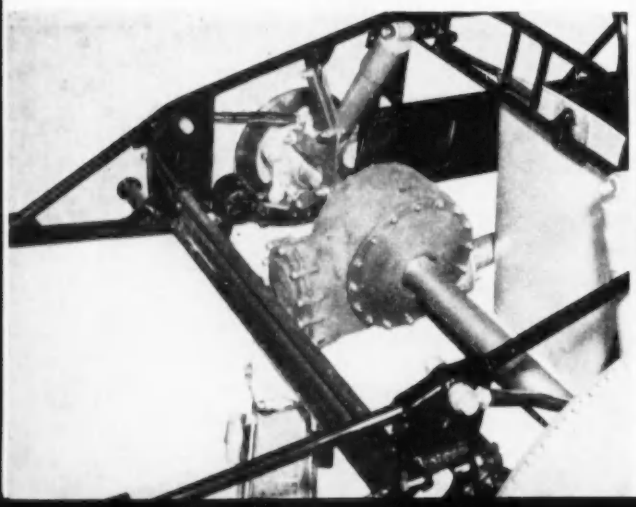
As for the efforts of Vukovich's competitors, it should be recorded that Art Cross, who finished second in the official standings, gave proof of his physical endurance as well as ability to "go." Cross' first start at Indianapolis was in 1952. He finished fifth that year. To make second this year is a good beginning for a racing career.

Ernie McCoy, who finished eighth, gave indications that he may develop into a very

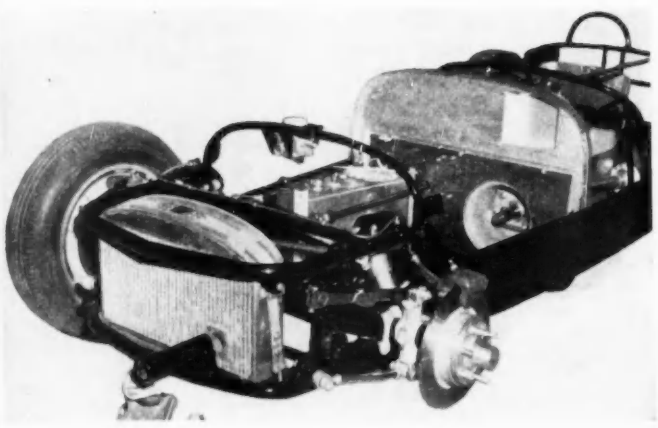


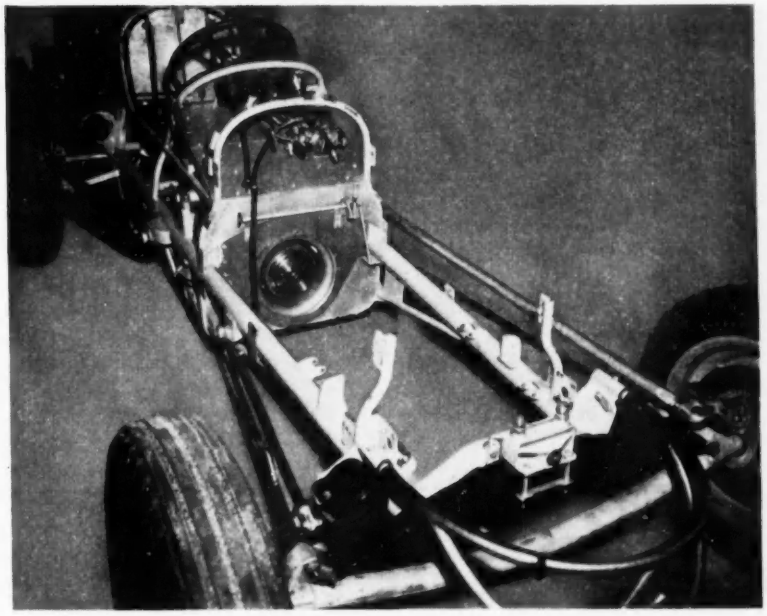
Exhaust header arrangement on one of the Type 500-B Kurtis-Kraft cars. Stacks from cylinders 1 and 4 are joined in one branch; from 2 and 3 in the other. The two branches are then faired into a single pipe several feet back of the engine. A result of this system is said to be more efficient scavenging.

Rear structure of the Type 500-B Kurtis-Kraft, as qualified by Agabashian, Parsons, Holland, and others showing transverse torsion bars, anti-sway truss, shock absorber installations, etc.



Front end of Kurtis-Kraft 500-B. Position of engine (not installed in car) is well to the left side of the chassis. Clutch shaft is shown extending through fire wall.





Chassis construction of the No. 98 Agajanian Special driven by Tony Bettenhausen. This car, driven by Troy Ruttman, was the 1952 winner. The car features a round steel tube frame, truss braced at the rear engine support. It has a transverse leaf spring at the front and torsion bars at the rear. Ed Kuzma was the builder of this chassis.

effective performer. This was his first appearance at the speedway. Marsnall Teague, also making his bow at Indianapolis, is a convert from the ranks of stock car competition. He ran well until forced from the race.

Otherwise, the tabloid story of the race in the table, terse though it may be, recaps all results and in an unromantic way will supply information on the fortunes of all starters. It covers the facts available at the time this report was written.

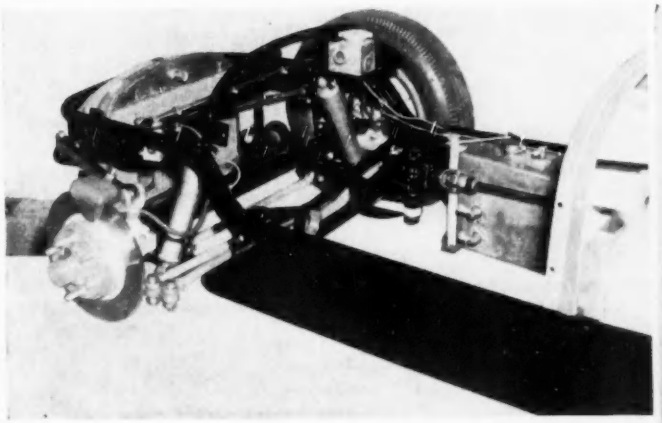
Beyond the table itself, it may be stated that magneto trouble again was present in epidemic form. Several cars which actually were running at the finish had changed magnetos during the race or had made long stops to repair the magnetos they started with. Heat always brings out magneto gremlins but there may have been other contributing factors in some of these cases. This paragraph is inserted because some of the actual troubles recorded do not appear in the table of results since the respective cars were running at the finish.

Tire results were about as predicted. The heat (ambient air temperatures in the low 90's—track temperature 130) was tough on tires, particularly in view of the record pace Vukovich threw on early in the race. It was, therefore, in no way surprising that numerous tire changes were made. In many instances *all* the changes actually made may not have been strictly necessary but under the existing conditions it was smart to change while a stop was being made.

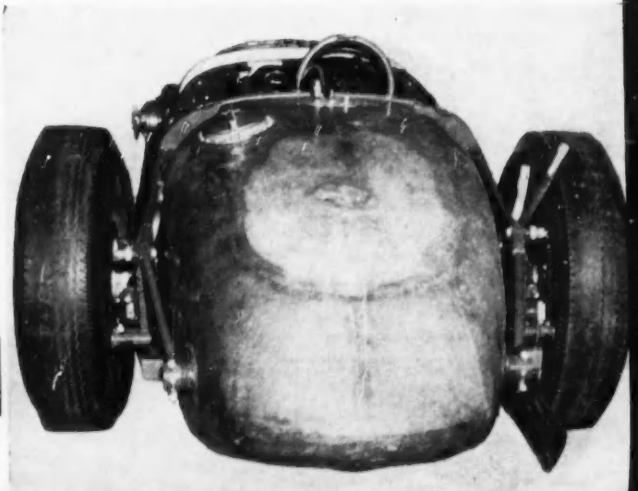
Most of the first 10 made three pit stops. The average approach to the tire problem was to change all four on the first two stops and just the ones requiring it on the final stop. The winning crew elected to change all four on their last stop even though they had only about 30 laps to go.

For the second year in succession there were no engine failures during the race. A first-hand check

Front end of Kurtis-Kraft 500-B. Note arrangement of steering gear and linkage.



Fuel tank of Kurtis-Kraft Type 500-B is covered with Fiberglas, but welds joining the various sections can be discerned. Several of the 500B tanks were not surfaced by Fiberglas. Capacity averages about 70 gal.



made the morning after turned up nothing serious in the powerplant department. Later, after engines are torn down, the story may be different but for now it is fair to state that the engines all stayed together.

Next to magnestos, oil tanks and oil leaks were most numerous offenders as causes of elimination. One or two cars ran out of oil for reasons not apparent at the time of discovery. There were three instances of failure in chassis structural parts—a third arm, a rear radius rod, and a front axle beam. The latter figured in a pair of crashes at the close of the race (one caused by another car taking to the infield to miss the machine with the broken axle) which resulted in all cars then running being flagged in the interests of safety.

Technical highlight of the 1953 race was the appearance of the Type 500-B Kurtis-Kraft machines. This design was partially described in AUTOMOTIVE INDUSTRIES, May 1, 1953, page 49. These cars made an impressive debut, taking to the course as naturally as ducks to a pond. Five of them qualified for the race, paced by Freddie Agabashian's first day average of 137.546 and Bill Holland's final day run of 137.868. Three finished in the first 10—the No. 59 Grancor, No. 53 Pat Clancy, and No. 2 Travelon Trailer Specials. Actually, Kurtis-Kraft cars (Models 500-A, 500-B, 3000, and 4000) took the first seven places.

The pre-qualifying predictions of higher speeds for the trials were not borne out, although the average qualifying speed of the 33 starters was upped about one mph over last year. Slowest qualified starter had a 135.262 run. Speeds on the head end were slower than expected. Weather, perhaps more than any other single factor, may have been the cause of this lapse. A brace of serious crashes in practice runs (one instantly fatal to veteran Chet Miller in a Novi — the other resulting in serious injuries to Cliff Griffith in a Bardahl-500B Kurtis-Kraft) possibly served to restrain the 140 mph ardor of those on whom the prophets had pinned their faith.

Problems of a technical nature also were encountered in pre-qualifying practice and they may have held speeds down. A veritable epidemic of piston distress raged for a week or more. This took its toll of parts and work in all quarters.

Fuel injection was used on all four-cylinder engines in the race. All cars used methanol base fuels. Fuel tanks were of three general types: welded steel for both three point and cradle mounted units; welded aluminum (*Turn to p.* 174)

1953 Indianapolis Race Story

RECAPITULATION

Start Row	Car No.	Car Name	Driver	Qualifying Speed	Engine	Laps Completed	Cause of Elimination (or No. of Pit Stops) For First Ten	Place and Average Speed
1	14	Fuel Injection Spl.	Bill Vukovich	138.392	4⅝x4½-270	200	3	(1) 128.740
	59	Grancor Elgin Piston Pin Spl.	Fred Agabashian	137.546	4⅝x4½-270	200	2	(4) 126.219
	5	Hinkle Spl.	Jack McGrath	136.602	4⅝x4½-270	200	2	(5) 124.556
2	88	Peter Schmidt Spl.	Manuel Ayulo	136.384	4⅝x4½	184	Oil tank leak	(13)
	32	Cop-Sil-Loy Brake Spl.	Andy Linden	136.090	4⅝x4½-270	3	Hit wall	
	98	Agajanian Spl.	Tony Bettenhausen	136.024	4⅝x4½-270	196	Broken front axle	(9) 122.453
3	55	John Zink Spl.	Jerry Hoyt	135.731	4.322x4⅝-271	107	Heat	
	21	Belond Equa-Flow	Johnnie Parsons	137.667	4⅞x4⅝-270	86	Oil leak	
..	3	Bardahl Spl.	Sam Hanks	137.531	4⅝x4½-270	200	3	(3) 126.465
4	92	Walker Spl.	Roger Ward	137.468	4⅞x4⅝-270	177	Broken rear axle gears	
	29	Belond Equa-Flow Spl.	Bob Scott	137.431	4.349x4⅝-274	14	Lost oil pressure	
	16	Spfld Clay Smith Welding Spl.	Art Cross	137.310	4.332x4.5-265	200	3	(2) 126.627
5	41	Fed. Engrg. Detroit Spl.	Gene Hartley	137.263	4⅞x4⅝-270	51	Hit wall	
	23	Auto Shippers Spl.	Walt Faulkner	137.117	4⅝x4½-270	176		Flagged
	38	Bob Estes Spl.	Don Freeland	136.857	4⅝x4½-270	76	Broken 3d arm, hit wall	
6	97	Agajanian Spl.	Chuck Stevenson	136.550	4⅞x4 5-253	42	Fuel tank leak	
	7	Fed. Engrg. Detroit Spl.	Paul Russo	136.219	4⅞x4⅝-270	87	Magneto coupling	
	62	Lubri-Loy Spl.	Spider Webb	136.168	4⅝x4½-270	166	Fuel tank leak	
7	73	McNamara Spl.	Carl Scarborough	135.963	4⅞x4⅝-270	190		(12) Flagged
	12	Chapman Spl.	Ernie McCoy	135.926	4.332x4 5-265	200	4	(8) 123.404
	48	Sumar Spl.	Jimmy Daywalt	135.747	4⅞x4½-270	200	2	(6) 124.379
8	22	Hart Fullerton Spl.	Marshall Teague	135.721	4.332x4½-265	169	Out of oil	
	83	Kalamazoo Spl.	Mike Nazaruk	135.706	4⅝x4½-270	146	Magneto trouble	
	77	Peter Schmidt Spl.	Pat Flaherty	135.668	4⅞x4⅝-270	115	Hit wall	
9	2	Travelon Trailer Spl.	Jim Rathmann	135.666	4⅝x4½-270	200	3	(7) 124.072
	9	Novi Governor Spl.	Duke Nalon	135.461	Wln. 3.19x2.84-182.15	19		(11) Flagged
	4	Miracle Power Spl.	Duane Carter	135.267	4⅝x4.5-270	94	Magneto failure	
10	49	Crawford Spl.	Bill Holland	137.868	4⅝x4½-270	177		(15) Flagged
	51	Dean Van Lines Spl.	Bob Swelkert	136.872	4⅞x4½-263	151	Broken rear radius rod	
	99	Miracle Power Spl.	Cal Niday	136.096	4.441x4⅝-271	30	Magneto failure	
11	8	Blakely Oil Spl.	Jim Bryan	135.506	4.332x4½-265	183	3	(14) Flagged
	53	Pat Clancy Spl.	Jimmie Davies	135.303	4.322x4½-265	193	3	(10) 119.203
	56	Dr. Sabourin Spl.	John Thomson	135.262	4⅝x4½-270	6	Split oil tank	
Alts.	26	Cy-o-Del. Spl.	Eddie Johnson	135.237	4⅞x4⅝-270			
	85	Blakely Oil Spl.	Johnny Tolan	134.852	4⅞x4⅝-270			

NOTE—All engines Meyer & Drake except Novi Governor Special which had a Winfield Special engine. It had the only supercharged engine and was the only front drive car.

Technical Details of Qualifying Cars

Car No.	Name	Driver	Chassis	Wheelbase (in.)	Springs	Weight (lb)	Tire Size	Magneto	Wheels
14	Fuel Injection Spl.	Bill Vukovich	Kurtis-Kraft 500A	96	Torsion Bars-Fr. & R.	1623	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
59	Grancor-Elgin Piston Pin Spl.	Freddie Agabashian	Kurtis-Kraft 500B	97	Torsion Bars-Fr. & R.	1775 (est.)	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
5	Hinkle Spl.	Jack McGrath	Kurtis-Kraft 4000	96	Transverse-Fr. Torsion Bar-R.	1640	7.10x16-Fr. 7.50x18-R.	Joe Hunt	Mg.
88	Peter Schmidt Spl.	Manuel Ayulo	Ed Kuzma	98	Transverse-Fr. Torsion Bar-R.	1600 (est.)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Mg.
32	Cop-Sil-Loy Brake Spl.	Andy Linden	Myron Stevens	100	Transverse-Fr. Torsion Bar-R.	1680	7.10x16-Fr. 7.50x18-R.	Joe Hunt	Mg.-Fr. Wire-R.
98	Agajanian Spl.	Tony Bettenhausen	Ed. Kuzma	98	Transverse-Fr. Torsion Bar-R.	1635	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
55	John Zink Spl.	Jerry Hoyt	Kurtis-Kraft 4000	97	Torsion Bars-Fr. & R.	1620 (est.)	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
21	Belond Equa-Flow Spl.	Johnnie Parsons	Kurtis-Kraft 500B	96½	Torsion Bars-Fr. & R.	1800 (est.)	7.10x16-Fr. 8.00x18-R.	Joe Hunt	Mg.
3	Bardahl Spl.	Sam Hanks	Kurtis-Kraft 4000	96	Transverse-Fr. Torsion Bar-R.	1670 (est.)	7.10x16-Fr. 8.00x16-R.	German Bosch	Mg.
92	Walker Spl.	Roger Ward	To Walker Specs.	100	Transverse-Fr. Torsion Bar-R.	1660 (est.)	6.00x16-Fr. 7.00x16-R.	Bendix-Scintilla	Mg.
29	Belond Equa-Flow Spl.	Bob Scott	Bromme	96	Transverse-Fr. Torsion Bar-R.	1500	6.00x16-Fr. 7.50x16R.	Joe Hunt	Mg.
16	Spgfld. Weld. Spl.	Art Cross	Kurtis-Kraft 4000	96	Transverse-Fr. Torsion Bar-R.	1530	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
41	Fed. Eng. Rc. Detroit Spl.	Gene Hartley	Kurtis-Kraft 4000	96½	Torsion Bars-Fr. & R.	1588	7.10x16-Fr. 8.00x16-R.	German Bosch	Mg.
23	Automobile Shippers Spl.	Walt Faulkner	Kurtis-Kraft 500A	97½	Torsion Bars-Fr. & R.	1700 (est.)	7.10x16-Fr. 8.00x16-R.	German Bosch	Mg.
38	Bob Estes Spl.	Don Freeland	To Estes Specs.	96	Transverse-Fr. Torsion Bar-R.	1600 (est.)	6.00x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
97	Agajanian Spl.	Chuck Stevenson	Ed Kuzma	96	Transverse-Fr. Torsion Bar-R.	1690	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
7	Federal Engrs. Detroit Spl.	Paul Russo	Kurtis-Kraft 3000	100	Torsion Bars-Fr. & R.-Ind. Fr.	....	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
62	Lubri-Loy Spl.	Spider Webb	Kurtis-Kraft 3000	100	Torsion Bars-Fr. & R.-Ind. Fr.	1730 (est.)	7.10x16-Fr. 8.00x16-R.	German Bosch	Mg.
73	McNamara Spl.	Carl Scarborough	Kurtis-Kraft	96¼	Transverse-Fr. Torsion Bar-R.	1680	6.00x16-Fr. 8.00x18-R.	German Bosch	Mg.
12	Chapman Spl.	Ernie McCoy	Myron Stevens	98½	Transverse-Fr. Torsion Bar-R.	1702	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
48	Sumar Spl.	Jimmy Daywalt	Kurtis-Kraft 3000	100	Torsion Bars-Fr. & R.-Ind. Fr.	1830	7.10x16-Fr. 8.00x16-R.	German Bosch	Mg.
22	Hart Fullerton Spl.	Marshall Teague	Kurtis-Kraft 4000	97	Torsion Bars-Fr. & R.	1725 (est.)	7.10x16-Fr. 8.00x16-R.	Bendix-Scintilla	Mg.
83	Kalamazoo Spl.	Mike Nazaruk	Harry Turner	97	Transverse-Fr. Torsion Bar-R.	1720	7.10x16-Fr. 8.00x18-R.	German Bosch	Mg.
77	Peter Schmidt Spl.	Pat Flaherty	Kurtis-Kraft 3000	100	Torsion Bars-Fr. & R.	1950 (est.)	7.10x16-Fr. 8.00x16-R.	Bendix-Scintilla	Mg.
2	Travelon Trailer Spl.	Jim Rathmann	Kurtis-Kraft 500B	97	Torsion Bars-Fr. & R.	1800 (est.)	7.10x16-Fr. 8.00x18-R.	Amer. Bosch	Mg.
9	Novi Gov. Spl.	Duke Nalon	Kurtis-To Novi Specs.	108	Torsion Bar-Fr. Semi-Ell.-Rear	2050	7.50x16-Fr. & Rear	German Bosch	Wire
4	Miracle Power Spl.	Duane Carter	Lesovsky-To Belanger Specs.	97½	Torsion Bars-Fr. & R.	1620 (est.)	7.10x16-Fr. 7.50x18-R.	Amer. Bosch	Mg.
49	Crawford Spl.	Bill Holland	Kurtis-Kraft 500B	96½	Torsion Bars-Fr. & R.	1820	7.10x16-Fr. 8.00x18-R.	Bendix-Scintilla	Mg.
51	Dean Van Lines Spl.	Bob Sweikert	Ed Kuzma	97	Transverse-Fr. Torsion Bar-R.	1600 (est.)	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
99	Mir. Power Spl.	Cal Niday	Lesovsky-To Belanger Specs.	97½	Torsion Bars-Fr. & R.	1600 (est.)	7.10x16-Fr. 8.00x16-R.	Amer. Bosch	Mg.
8	Blakely Oil Spl.	Jim Bryan	Gordon Schroeder	100	Torsion Bars-Fr. & R.-Ind. Fr.	1725 (est.)	7.10x16-Fr. 8.00x18-R.	German Bosch	Wire
53	Pat Clancy Spl.	Jimmie Davies	Kurtis-Kraft 500B	96½	Torsion Bars-Fr. & R.	1800 (est.)	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.
56	Dr. Sabourin Spl.	John Thomson	To Del Roy Specs.	96	Transverse-Fr. Torsion Bar-R.	1600 (est.)	6.00x16-Fr. 8.00x18-R.	Joe Hunt	Mg.
*28	City of Det. Spl.	Eddie Johnson	Kurtis-Kraft 4000	96	Torsion Bars-Fr. & R.	1615 (est.)	7.10x16-Fr. 8.00x16-R.	German Bosch	Mg.
*85	Blakely Oil Spl.	Johnny Tolan	Kurtis-Kraft 4000	96	Transverse-Fr. Torsion Bar-R.	1605	7.10x16-Fr. 8.00x16-R.	Joe Hunt	Mg.

Above data obtained from AAA Technical Committee records as of 5 29.

* Alternate starters.

All cars equipped with Champion spark plugs but the Novi—it was listed for Bosch but may have used Lodge or KLG.

All cars equipped with Perfect Circle piston rings but the No. 56 Dr. Sabourin Spl. It used Grant rings. Two cars—the No. 4 and 99 Miracle Power Spls.—had Perfect Circle piston rings but had not officially so listed them with the Technical Committee.

Most magnetos listed as Joe Hunt were basically Bendix-Scintilla.

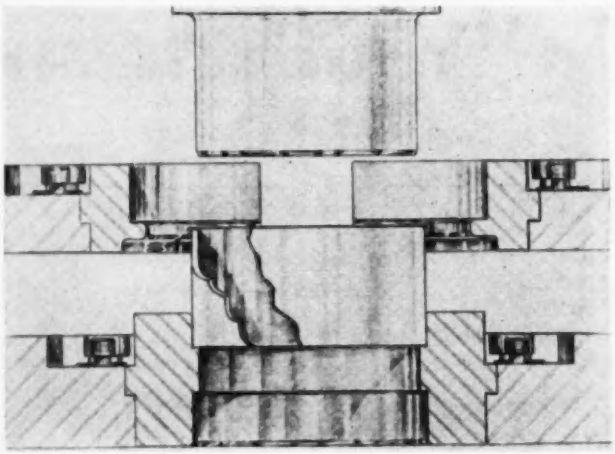


Fig. 1—A cutaway sketch of the cam action dies, with the top form dies open. A sleeve has been placed in the bottom pusher die, and is resting upon the die shoulder. The punch has started its down stroke, the cams have not started to close the top form dies. The bottom pusher dies are reversible for both types of ends.

Northrop Tooling Technique Reduces

By developing a new and better way of making a single type of part used in large quantities on the U. S. Air Force's Northrop Scorpion F-89 all-weather interceptor, tooling engineers have achieved large savings in production costs.

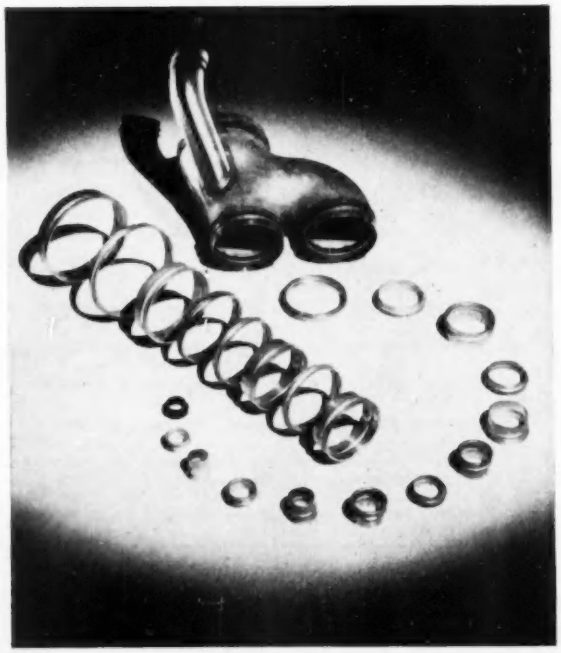
The cost savings were obtained by the development of cam action punch press dies to form stainless steel ends for hot air ducts used in the Scorpion F-89. These rings are made of No. 321 and No. 347 stainless steel and vary from one in. to 5¼ in. in diameter. Because they had to be fabricated to extremely close tolerances, the accepted and conventional way of manufacturing them was to machine them from heavy wall tubing stock. Use of punch press forming in lieu of machining for these parts has resulted in a reduction of fabrication time from up to three hours to less than five minutes per part. Because of the large number of connectors used on each airplane, the total savings will exceed $1 million, according to estimates of Northrop's cost estimating department.

For joining hot air ducts, Northrop engineers developed a self-sealing, molded silastic seal. This seal is backed up by a metal clamp, which confines the seal and holds the ducts together by clamping over flanges on the duct ends. These flanged duct ends, however, had to be held to a 0.010 in. diameter and 0.005 in. concentricity tolerance to assure a perfect seal. This ordinarily would necessitate a machined part.

Tubing of the right diameter and wall thickness was not always available, requiring that many of these parts had to be turned from solid stock. This was an expensive operation in both time and material.

A 5.25-in. diameter duct end, for example, when turned from tubing with a 0.375-in. wall thickness, required three hours to machine, with a loss of two lb of stainless steel. This prompted an investigation by the tooling development department, which resulted

This illustration shows 21 of the 32 different sizes and types of connectors made by the new process. Directly behind them is a typical duct section employing four of these connectors. The flange on the connector is welded to a flange on the duct section.



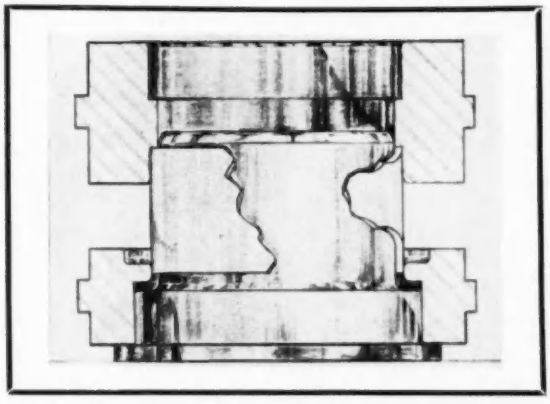


Fig. 2—The punch has entered the sleeve. The cams have closed the top form dies. As the punch continues downward, the radius on the punch directly above the sleeve will turn the sleeve outwardly into the die aperture. The punch shoulder will pick up the top form dies and depress them over the sleeve.

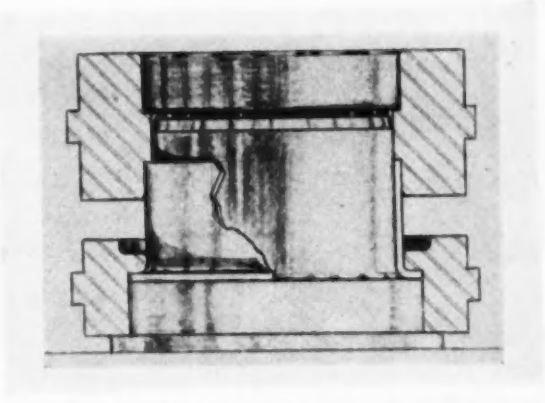


Fig. 3—It requires more pressure to buckle the tube into a bead than is required to turn the flange, so the flange is the first to form. The top end of the sleeve has been turned outwardly by the radius of the flanging punch, forming a flange which stops when it bottoms against the extremity of the die cavity.

Aircraft Part Cost

in the development of the cam action dies, which form these parts in a punch press from 0.035-in. wall tubing up to 2.00 in. diameter, and from 0.035 in. strip stock welded into sleeves up to 5.25 in. diameter.

The strip stock is rolled into a sleeve, and welded on a steel mandrel. A copper insert prevents the weld from sticking to the mandrel. A unique clamping arrangement is provided for clamping the strip stock to the mandrel by clamping completely around the periphery of the strip stock except at the weld area.

The sleeve is Heliarc welded with a little build-up at each end of the weld to prevent undercutting. The mandrel and sleeve are removed from the clamp and placed on a pin, which permits the sleeve to be turned into a contact sanding belt, which removes the excess weld flush with the surface. There is no drop-through of weld on the inside of the sleeve. The sleeve is then forced from the mandrel, which has sized it within plus 0.005 in., minus 0.003 in. diameter tolerance.

Prior to designing the forming dies, tests were made to determine the forming characteristics of the sleeves. It was found that by providing a punch with an 0.090 in. radius for the sleeve to form against, a flange was easily formed, as illustrated in Figs. 2 and 3. The flange, however, will continue in an arc forming a grommet unless it is restricted. Punches are provided for each different sleeve wall thickness in order to maintain a minimum cavity between the punch and die to assure a flat flange and prevent wrinkling the sleeve.

Each set of dies for the various diameter parts was developed to use the same width sleeves, so that one

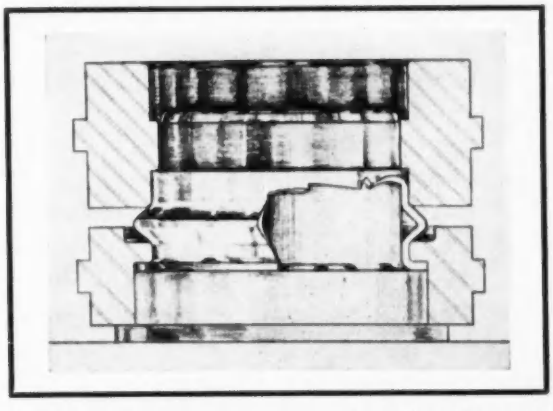


Fig. 4—The top form dies and punch continue downward and are buckling the sleeve outwardly in the unsupported area between the top and bottom dies.

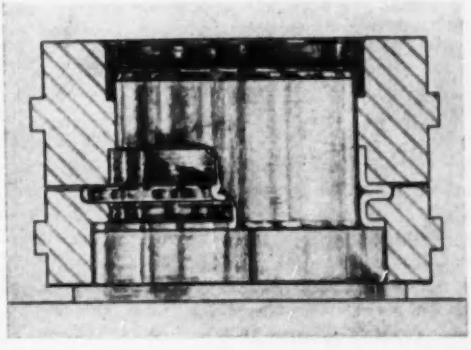


Fig. 5—The dies have bottomed, the flange has been formed, the buckle has formed an upset bead into the recess provided in the top form dies, which restricts the maximum height and thickness of the bead. The material is completely confined by the dies and punch which makes it possible to control all the physical dimensions of the completed part.

This shows the die set mounted in a six in. stroke punch press. The bottom dies are stationary. The top dies are made in two segments which are fastened to the two sliding die holders and are spring loaded in the open position. The top die set is held in location with stripper bolts and is spring loaded with twelve Danley heavy duty die springs. On the right of the dies set are parts which have just been formed, and on the sub-bolster in front of the die set are two sleeves to be formed.

width of strip stock could be used for all sleeve diameters. Using strip stock eliminates handling and shearing operations on sheet stock. It is slit to width on slitting rolls to maintain a constant dimension, is absolutely uniform the entire length of the roll, and the cost is considerably less than sheet stock.

The flange height is 0.130 in. and the upset bead height is 0.180 in. maximum above the sleeve outside diameter. The upset bead was first formed by using heat on a flashweld machine, but it was found that heat was not necessary. Better parts were made when they were worked cold, so the cam action, punch press dies were developed. Although this is an unusually high bead to be formed cold, it is within the elastic range of the material. The Heliarc welds are ductile, and have given no difficulty.

• • •

Packaging Men Show Money-Saving Techniques

More than 350 exhibitors, occupying a total of 130,000 sq ft of display area, with an attendance of upwards of 20,000, made a success of the American Management Association's 22nd National Packaging Exposition in April, according to association spokesmen.

The packaging engineer's duties should be broad enough to encompass production, inspection, plant movement, storage, loading, and shipping from the standpoint of product protection, said R. Frank Weber, general supervisor, materials handling research, Manufacturing Research Dept., International Harvester Co. At I H, he reported, planning for over-all packaging programs is centralized in the materials handling research section. The laboratory staff, he said, work closely with materials handling engineers and plant staffs in any development that concerns the latter groups and are available as consultants for all Harvester operations. They also maintain contacts with representatives of vendors and suppliers and with outside industries and laboratories.

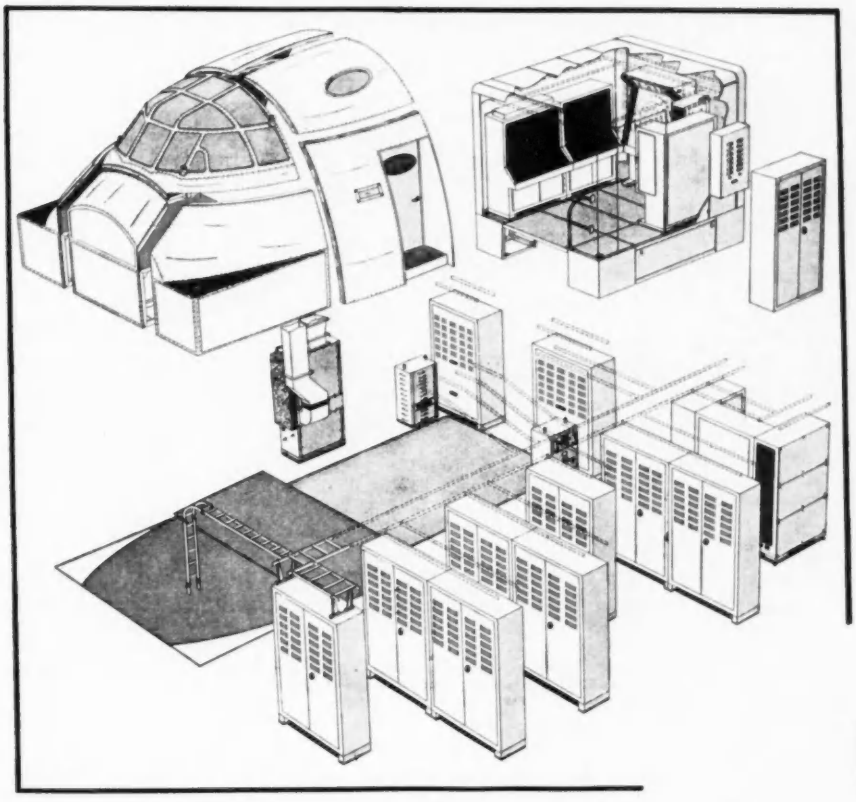
Trends in Harvester's export packing listed by Mr. Weber include improvements in storage and warehousing methods to give added protection and conserve large areas formerly wasted through antiquated practices; export packing by contractors at ports, often including cargo containers to help prevent damage to fragile goods and stop pilferage of small articles; improved knowledge of handling and storage conditions in foreign countries; special training for packaging engineers; and coordination of the efforts of shippers, railroads, ocean carriers, marine underwriters, and others interested in adequate export packing.

Odd-shaped parts need not always remain odd-shaped parts; sometimes the product can be redesigned to eliminate the special packaging problem, said Carroll W. Evans, superintendent, parts and accessories division, Studebaker Corp.

Gas tanks for years had a long, integral, non-detachable crooked spout which presented a never-ending problem in packaging, Mr. Evans reported. Finally the tanks were redesigned to include a detachable spout which is now shipped unassembled. Studebaker, he said, attempts to make the product fit the package, the package fit the pallet, and the pallet fit the method of transport.

Mr. Evans suggested several general rules to make packages as easy

(*Turn to page* 98, *please*)



These major components make up the new C-124A simulator. Exploded view shows cockpit, instructor's compartment, air conditioning equipment (just under the cockpit and with two ducts showing), and various power supply, radio aids, and analog computer cabinets.

Flying Without Wings

All-Electronic Flight Simulator

Can Save Up to Two-Thirds of Cost in Training Crews

LATEST feature of the Curtiss-Wright Dehmel flight simulator for training aircraft crews is all-electronic loading so designed to meet the need for more realistic aircraft response in a ground trainer. Prior to the use of the completely-electronic system, the simulators utilized electronic-mechanical components to establish the required loading. This was accomplished through the use of calibrated springs.

In order to speed up the current delivery of from 15 to 18 months per simulator, C-W designers have standardized on several internal components as well as exterior cabinets. Not only does this provide for earlier delivery dates, but permits the project engineers to concentrate on the several variables that must be engineered into the several analog computors that make up each flight trainer. One computer is used for each aircraft engine, and either piston or jet engines can be simulated.

The first unit to incorporate the all-electronic system is the recently produced simulator for the C-124A Globemaster. To be installed at the Air Force base in West Palm Beach, Fla., the synthetic crew trainer will reproduce in perfect safety to personnel and equipment many emergencies that would be too dangerous to try in actual flight.

Not only is the cockpit an exact duplicate of that found in the actual transport, but the simulator provides a feeling of actual flight as a result of realistic sound effects. These effects permit the crew to hear engine and propeller noises and the sound of wheels hitting the runway as the simulator is brought in for a landing. All of the sound effects are reproduced electronically.

According to C-W officials, the simulator saves up to 66 per cent of the cost in training crews. It is also claimed that there is very little downtime—average availability is about 99.2 per cent.

Observations on 1953 Economy Run

By Max Epps
ENGINEER
General Petroleum Corp.

THROUGH the years the Mobilgas Economy Run has become a real part of the automotive industries because it serves a peculiar and useful place in the scheme of things. The event originally started purely as a sales promotion. Now it has reached maturity and is continued on its present larger scale because it brings benefits to the automobile manufacturer, the petroleum marketers, and especially to the public. It does these things:

1. Ever since Carnot developed the laws of heat engine efficiency engineers have worked to make these engines more efficient. They have come a long way, and the run provides a stage whereon they can demonstrate this progress with sufficient showmanship to put it across to a larger number of people.

2. The petroleum people spend a lot of money to make good gasoline. The event focuses attention on the bargain which the public gets in motor fuel. For example, the average passenger in the 1953 Run used only 13.76 gallons of gasoline to ride 1206 miles. At 30¢ per gallon (including 6¢ tax) it cost the passenger only $4.13 for enough energy to ride from Los Angeles, Calif., to Sun Valley, Idaho.

3. The public benefits perhaps the most because oil is a valuable natural resource and money is a cherished possession. The Mobilgas Economy Run is publicizing a doctrine that both can be saved without any sacrifices.

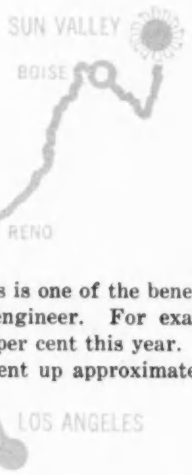
Such is the philosophy of the Run. The next question, especially from an engineering standpoint is what did we learn and how can we use it? In looking over the result sheet there are some interesting comparisons that can be made with last year. Remember the course is altered annually in order to give all contestants an even break. Continual practice over a fixed course would overemphasize the driver element and give old timers on the Run a tremendous advantage over newcomers. However, the general Run conditions are somewhat similar and some comparisons can be drawn from observing the results as shown in Table I.

It seems that a trend has developed, and that gives each designer an opportunity to plot his own cars

FINAL RESULTS—1953 MOBILGAS ECONOMY RUN

Class	Make and Model	Place	Miles Per Gallon	Ton Miles Per Gal
A	Low Price—Standard & Overdrive			
	Chevrolet Two-Ten	**	.....	.....
	Ford Mainline "6"	1*	27.0335	56.7028
	Ford Customline "8"	3	22.5183	48.5494
	Hudson Super Jet	4	25.4279	47.9825
	Plymouth Cranbrook	5	22.8301	46.9501
	Studebaker Champion	2	26.8622	50.8770
B	Low Price—Automatic Drive			
	Hudson Jet	1	22.0575	42.4606
C	Low Medium—Standard & Overdrive			
	Dodge "V-8"	1	23.4189	52.8565
	Mercury Monterey	2	23.1554	52.5629
	Studebaker Commander	3	24.5080	50.9767
	Studebaker Land Cruiser	4	23.3962	49.7755
D	Low Medium—Automatic Drive			
	Hudson Super Wasp	2	19.0956	45.1229
	Nash Statesman	3	19.4439	41.5321
	Studebaker Land Cruiser	1	22.8885	49.3476
E	Upper Medium—Standard & Overdrive			
	De Soto Firedome "V-8"	2	20.9209	50.9843
	Kaiser Manhattan	3	22.2707	49.0847
	Nash Ambassador	1	22.5457	51.3140
	Packard Clipper	4	18.6737	45.2838
F	Upper Medium—Automatic Drive			
	Hudson Hornet	3	18.9473	46.2409
	Kaiser Dragon	2	21.4489	47.9835
	Nash Ambassador Custom	1	21.1156	48.9037
G	High Price—Automatic Drive			
	Chrysler Imperial	2	17.2909	48.1553
	Chrysler New Yorker	3	17.7479	45.7009
	Lincoln Capri	1	19.9416	52.3467
H	Special Lightweight Class			
	Henry J. Corsair "4"	1	28.2587	48.5768
	Nash Rambler Super	2	25.3748	45.2432

*—Sweepstakes winner.
**—Automatically disqualified, got off course and ran short of fuel.



against the average. This is one of the benefits which the Run brings to the engineer. For example, the weight is down about 10 per cent this year. Also, the average running speed went up approximately 10 per cent. Even with the higher speed, there was a very slight gain in miles per gallon. It also appears that rear axle ratios are lower this year.

Another comparison which might bear some further observation is the improvement in performance of automatic transmissions in relation to overdrive transmissions. This advantage of 4.97 ton miles per gallon in 1952 dropped to 2.99 in 1953. This may indicate either or both of the following reasons: first, the higher speed may have forced the overdrives into a less favorable condition especially in the mountains and/or second, the automatic units are showing considerable improvement.

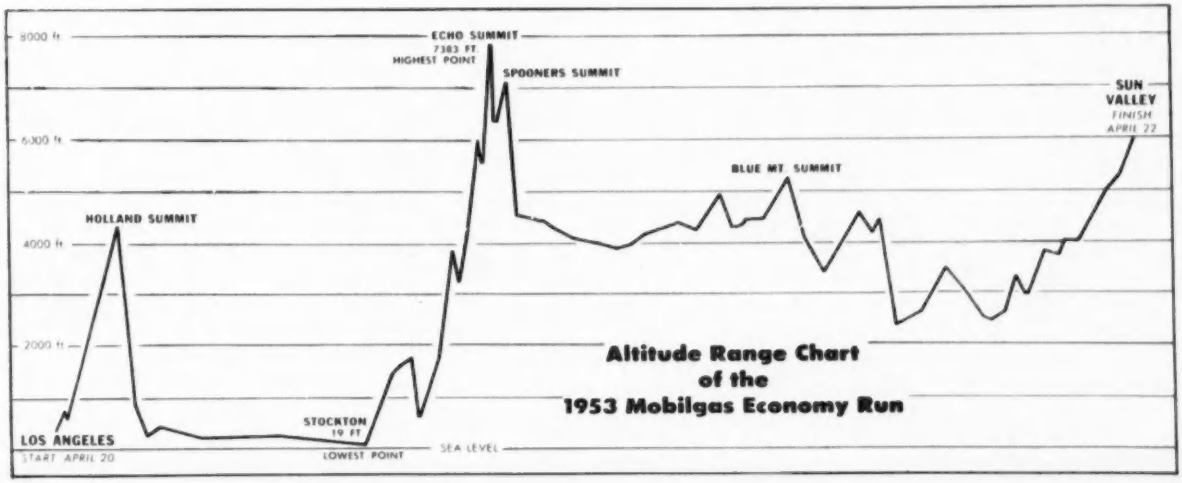
These are but a few of the observations which can be made from the data obtained. Each year a concentrated effort is made to improve the rules of the Run and to try and obtain the maximum amount of useful data. The purpose of the event is to provide an impartial, practical test of new model automobiles under exactly the same conditions the average motorist experiences. It is designed to show the normal driver what the performance capabilities and mileage possibilities of his own car are when it is adequately maintained, safely driven and properly fueled. The "ton-mile" formula is one adopted by the American Automobile Association to give all contestants an equal chance, regardless of size and weight.

Certainly the event represents a great deal of cooperative work and with each succeeding event the results will become more significant and useful.

TABLE 1—COMPARISON OF RESULTS

	1952	1953
No. cars with overdrive	16	15
No. cars with automatic transmissions	7	10
No. cars with standard transmissions	2	0
Average weight, lb	4,870	4,400
Average speed, mph	40.8	44.7
Average gear ratio (rear axle) OD cars	4.36	4.26
Average gear ratio (rear axle) auto. trans. cars	3.47	3.31
Average ton miles/gal overdrive	54.23[1]	49.74[1]
Average ton miles/gal auto. trans.	49.26[1]	46.75[1]
Average ton miles/gal advantage of overdrive over auto. transmission	4.97	2.99
Average miles per gal all cars	22.01	22.28[2]
Average ton miles/gal all cars	49.99[2]	48.62[2]

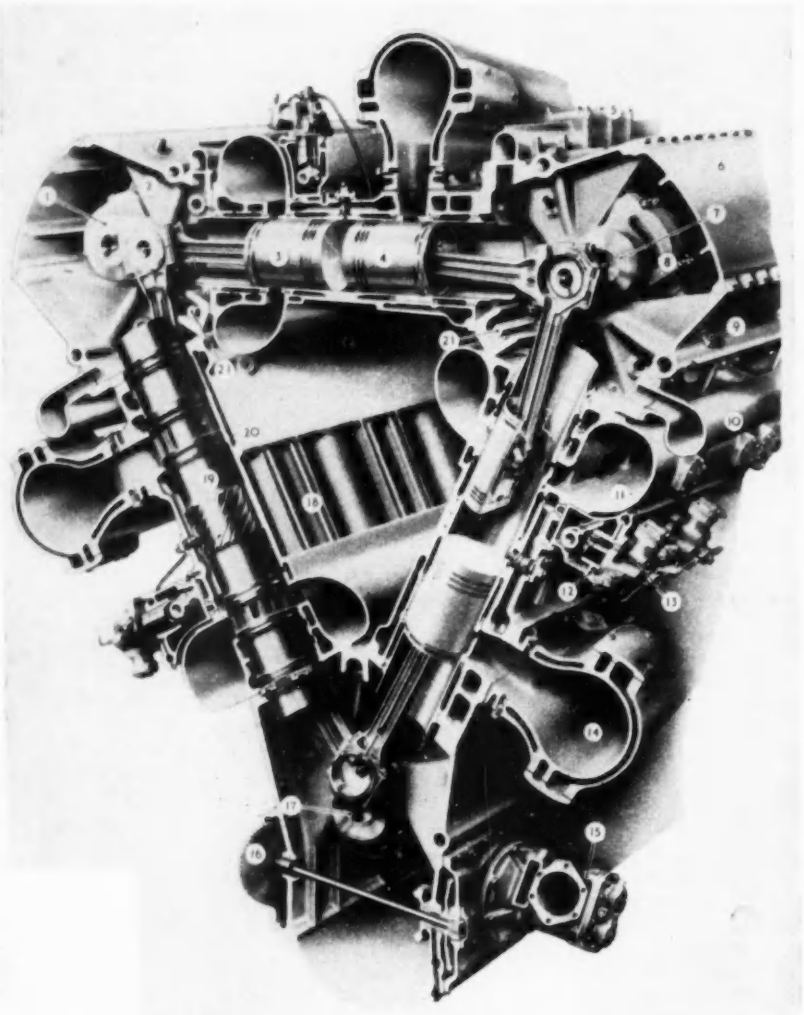
NOTE: [1] Average of total weight and total gal for a class as a whole.
[2] Average of individual cars.



Altitude Range Chart of the 1953 Mobilgas Economy Run

KEY

1—'BC' Crankshaft
2—'BC' Crankcase
3—Inlet piston
4—Exhaust piston
5—Crankcase breather
6—'AB' Crankcase
7—'AB' Crankshaft
8—Main bearing cap
9—Crankcase tie-bolt
10—Drain oil manifold
11—Air inlet gallery
12—'A' Camshaft casing
13—Fuel injection pump
14—Exhaust manifold
15—Sea-water pump
16—Fresh-water pump and pressure oil pump drive gear
17—'CA' Crankshaft
18—Cylinder block tie-bolts
19—Cylinder liner
20—'C' Cylinder block
21—Blower flexible drive shafts



Cutaway view of Napier Deltic engine.

British Diesels

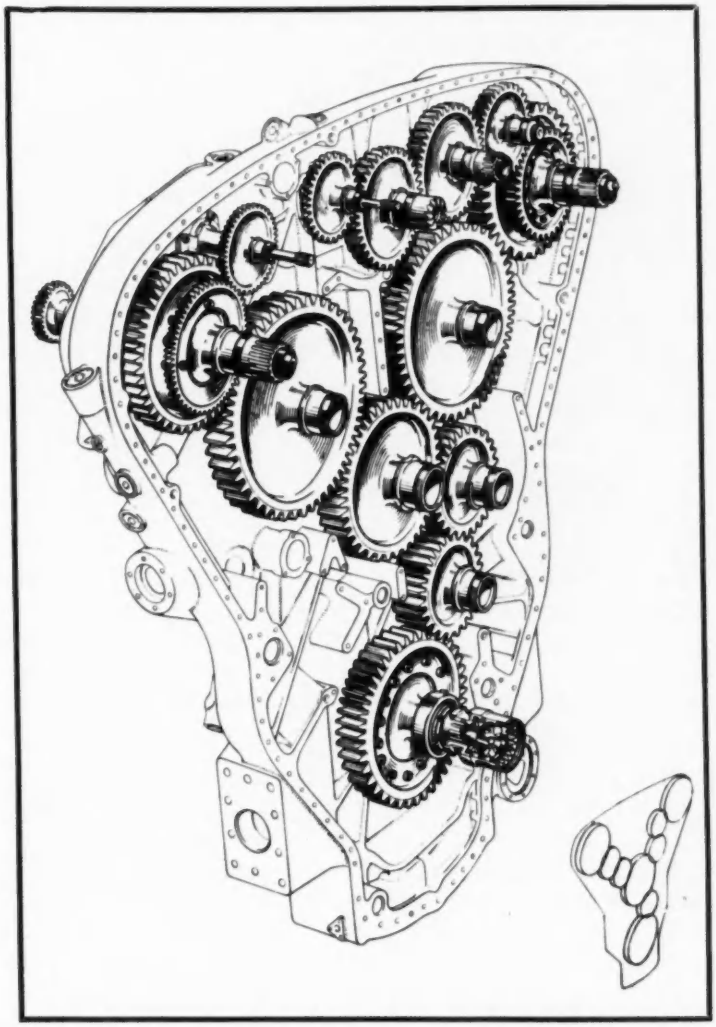
LONDON, ENGLAND

Low weight per horse-power and unique design are features of the opposed piston Deltic built by D. Napier & Son, Ltd., of London, a subsidiary of the English Electric Co. Designed and developed for the British Navy, this 2500-hp, two-stroke Diesel is intended for stationary as well as various marine applications.

It has 36 pistons in 18 cylinders arranged in six parallel triangles. The three crankshafts drive a common output shaft through a gear train. Bore and stroke are 5⅛ in. and 7¼ in. with a piston displacement of 5300 cu in. Max crankshaft speed is 2000 rpm. The engine is nearly 11 ft long and over seven ft high; weight, 8725 lb. Wgt-to-power ratio is 3.5 lb per hp.

One technical advantage claimed for this geometrical cylinder arrangement is that the resultant phase angle difference between exhaust and intake crankshafts makes possible an extremely efficient porting layout. Another is that since each crankpin carries one inlet and one exhaust piston, the loading on each crankpin, and therefore the power transmitted through each crankshaft, is identical. Extreme smoothness in running is thus said to be definitely obtained.

Two wide angle fuel injectors fed by a single pump are provided for each cylinder. The six pumps for each cylinder bank are operated by a camshaft extending the length of the block. Pistons are of two concentric parts, the inner member being linked by a piston pin to the connecting rod and secured to the



Arrangement of phasing gearing of Deltic engine.

cast aluminum outer casing by a snap ring. The annular chamber between the two is fed with oil, for cooling purposes, by the connecting rod.

Connecting rods are of the fork and blade type, since there are two of them on each crankpin. The seven bearing crankshafts are fully nitrided, and main journals run in bearings formed into the cast aluminum crankcases. Oil is supplied through galleries in the crankcases to each bearing and thence through passages in the crankshafts to the crankpins. Pressure lubrication is used throughout.

The cylinder jackets form part of a closed cooling system in which distilled water is circulated through a heat exchanger by a centrifugal pump on the engine. For marine operation, sea water is circulated through the cool side of the heat exchanger by a gear pump. Thermostatic temperature control is provided.

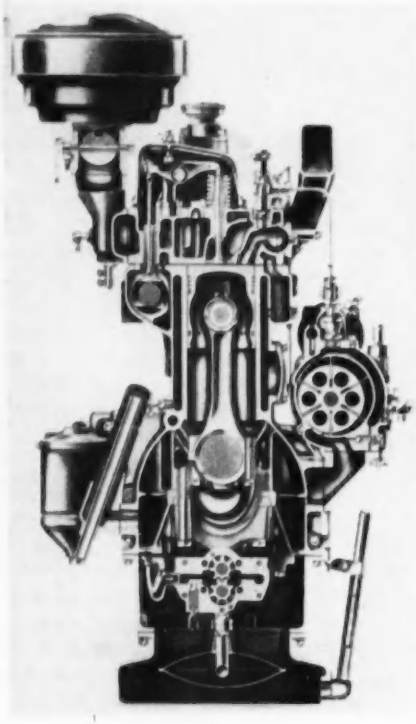
Scavenge air for the engine is supplied by a single-stage, double-sided centrifugal blower. The reversing mechanism takes the form of two constant-mesh gear systems, selection being made by hydraulically-loaded plate clutches. There is a combustion starter in which a cartridge is fired into a cylinder containing a piston mounted on a helically-splined shaft carrying a Bendix-type claw coupling. A rotary breech carries five electrically-fired cartridges.

Components of the Deltic are small enough to permit the use of aero engine materials and manufacturing techniques. This has made possible the employment of hardened crankshafts, thin wall lead bronze bearings, and case-hardened and ground gears. A nine cyl version also is being produced in the triangular form.

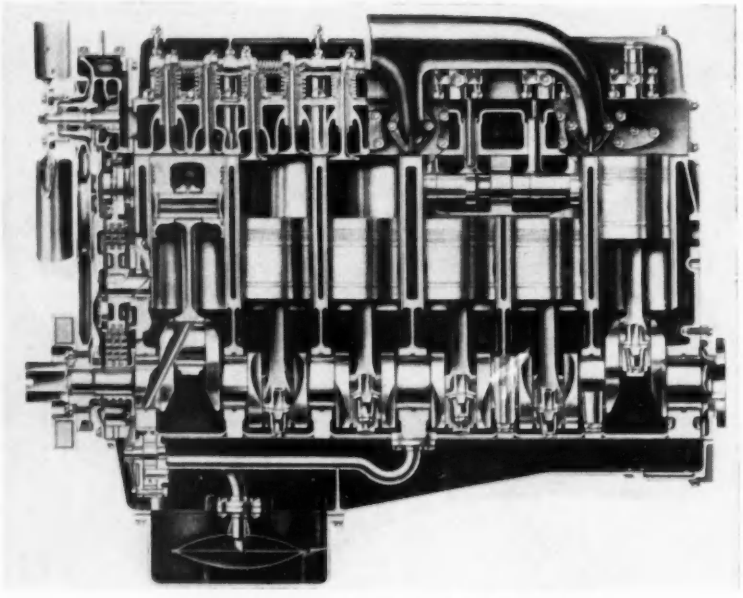
The model R6 is the newest engine of Britain's largest Diesel manufacturer, F. Perkins Ltd. of Peterborough, and is intended primarily for export to countries where road transport speeds are higher than are usual in the U. K. This is a six cyl, ohv unit developing 108 hp at 2700 rpm, and has a maximum torque of 240 lb ft at 1500 rpm. With a 4 in. bore and 4½ in. stroke, piston displacement is 340 cu in.

The patented "Aeroflow" combustion system, with fully machined chamber and throat, is used. This obviates the need for masked valves or other restrictive methods of producing swirl and permits the use of large-diameter valves resulting in high volumetric efficiency. Cylinder block and crankcase are cast in one piece. Dry type, press fit liners are employed, and the light alloy pistons carry three compression and two oil rings.

The crankshaft is carried in seven bearings with all journals induction hardened, while connecting rods are high tensile alloy steel forgings. Torsional vibration is minimized by an eight in. viscous type damper at the front end of the crankshaft. In addition to the vacuum governor there is a cam-operated idling damper which is said to eliminate surge at low engine speeds. *(Continued on next page)*



Transverse section of the Perkins R6 Diesel.



Longitudinal section of the Perkins R6 Diesel.

Pressure lubrication is afforded by gear pump. The starter is a 24-volt unit, and cold weather starting is assisted by a pair of series-connected 12-volt heaters in the intake manifold as well as by a priming pump. Weight of the R6 is 914 lb less flywheel; mounting may be either three or four point.

• • •

Standard Steel Spring to Merge With Timken

Directors of both Timken-Detroit Axle Co. and Standard Steel Spring Co. have approved merger of the two firms into a new company to be known as Rockwell Spring and Axle Co. Stockholders will be asked to approve the proposed merger by next September with the actual merger, if it is approved, to become effective Sept. 30.

Col. Wm. F. Rockwell, currently chairman of both firms, said the consolidation will balance operations of the two companies and make possible a broader line to automotive, farm equipment, and roadbuilding customers.

Timken-Detroit manufactures front and rear axles for commercial vehicles, heating equipment, and other products at its plants in Detroit and Jackson, Mich.; New Castle, Pa.; Oshkosh, Wisc.; Utica, N. Y.; and Ashtabula, Canton, and Newark, O. The company last year had earnings of more than $6.8 million on sales in excess of $233.3 million.

Standard Steel Spring's principal products are leaf springs, bumpers, and other automotive parts. It has plants at Detroit, Allegan, and Chelsea, Mich.; Coraopolis, Pa.; Gary and Logansport, Ind.; Newton Falls, O.; Trenton, N. J., and Los Angeles. Its earnings last year were more than $6.35 million on sales of $144 million. The new company will have 21 plants with more than 19,000 employes, and will produce axles and transmissions for trailers and tractors, bumpers, springs, universal joints, power takeoffs, heating units, forgings and stampings, and armor plate for tanks.

Capitalization of the new company will consist exclusively of common stock with one share to be issued in exchange for each share of common stock of the two merging companies. R. C. Enos, president of Standard Steel Spring, will be president of the new company. Walter F. Rockwell, president of the Timken-Detroit Axle, will retire. As of last March 31 the two firms had combined assets of nearly $155 million and working capital of more than $7.26 million.

Direct-Reading Spectrometer

A unique new direct-reading spectrometer is testing metals used in C-119 production at the Fairchild Aircraft Div., cutting time on one operation from four hours to five minutes.

Through a combination of simultaneous electronic, optical, and mechanical operations, the spectrometer analyzes metal samples and provides an instantaneous reading on the percentage of each element in the metal on dials.

The spectrometer at Fairchild is one of the few direct-reading analyzers in use in the aircraft industry. While a small number of direct-reading spectrometers are employed by steel mills and foundries, they are limited in the variety of metals and elements they can analyze. The equipment can handle metals having five different matrices or alloy bases—aluminum, brass, stainless steel, magnesium, and low alloy steels. Metal in the form of rods, plates, billets, sheets, extrusions, tubes, bars, and forgings can be tested with equal facility.

Sales of Materials Handling Industry Now Over Billion Dollar Mark

By Thomas Mac New

Huge Industrial Exhibition, Together With Technical Sessions, Attracts Large Crowds to 5th National Event Held in Philadelphia

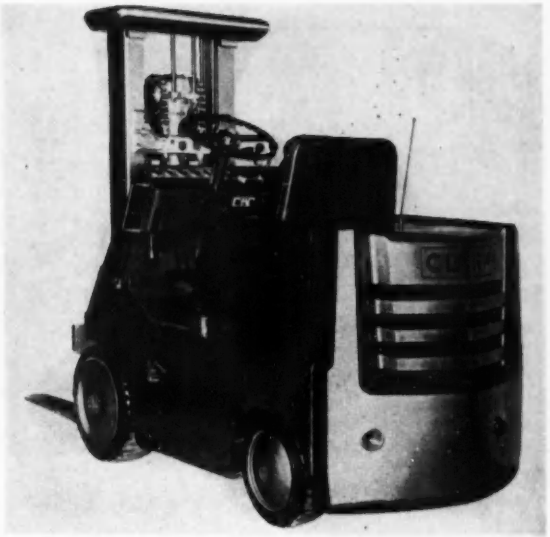
HIGHLIGHTED by the introduction of modernistic industrial trucks and extremely active technical sessions, the 5th National Materials Handling Show held in Philadelphia last month was claimed a great success by materials handling executives. Approximately 27,000 persons concerned with the movement of material wended their way through $10 million worth of exhibits put on display by 340 companies engaged in the industry.

Exhibitors were extremely optimistic as some industry executives estimated that orders during the next year, directly traceable to the show as a result of inquiries received, may run as high as a quarter to a third of a billion dollars. Manufacturers of the heavier types of materials handling equipment expressed surprise at the sales made off the floor as orders taken at the show are said to total into the millions of dollars.

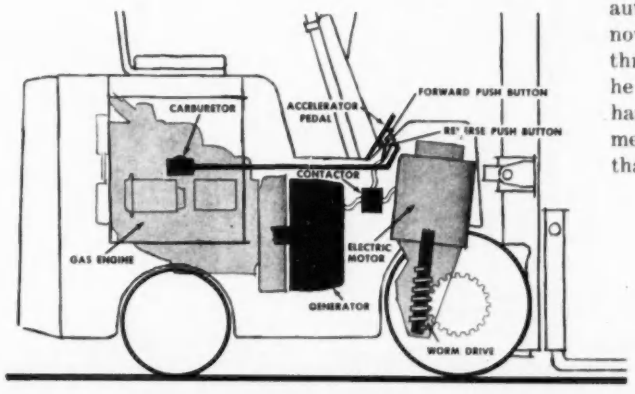
The show was sponsored by the Materials Handling Institute while the technical sessions, or workshop seminars as they were called, were sponsored by the American Materials Handling Society. Neil Drake, of Drake, Startzman, Sheahan and Barclay, New York City management consultant firm, was the Society's featured speaker.

He stated that although sales of the industry have climbed to well over the billion dollar mark, the potential market has scarcely been touched. Speaking about automation, Mr. Drake estimated that ten years from now a substantial portion of materials will move through our plants by automatic processes. One point he stressed was that although some of the materials handling people may never design automatic equipment, they should be able to recognize those operations that lend themselves to automation.

(*Turn to page 96, please*)



Experimental fork truck, the Clark X-70, features a fully-automatic drive, a streamlined body and lighter frame, adjustable automotive-type seat, counterbalanced hood, and greater accessibility. It utilizes the Clark Hydratork drive which combines a torque converter with a simplified forward and reverse transmission.



Layout of the various components used for the gasoline-electric drive are depicted in this line drawing of a Baker-Raulang Gas-O-Matic fork lift truck. In addition to the items shown in the illustration, a hydraulic system is employed for the fork lift mechanism.

BUICK

Completes Tooling

Perspective view of one of three Footburt transfer machines installed on the cylinder block lines. These are 19-station machines, tooled for drilling of holes in the top and bottom, including also odd pad holes, and milling of bearing locks. This equipment was described in AUTOMOTIVE INDUSTRIES, March 1, 1953.

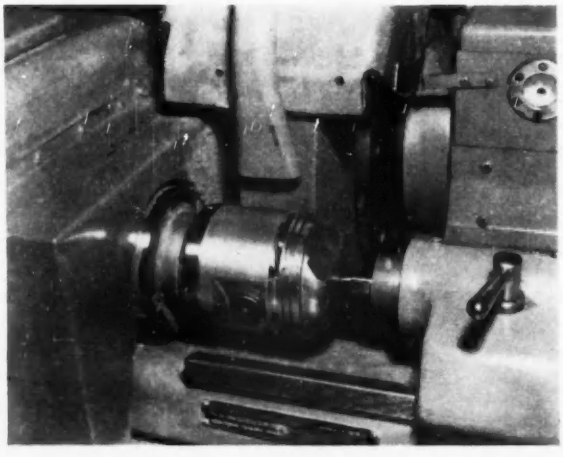
THE new Buick plant for producing V-8 engines is so extensive in scope and so loaded with outstanding items of transfer equipment that an arbitrary highspotting of operations fails to do it full justice. To present an early coverage of this important facility, we published the first description of the plant in AUTOMOTIVE INDUSTRIES, February 1, 1953, immediately after announcement of the 1953 cars; and followed with another article in the March 1, 1953, issue. The present article, the third in the series, is intended to cover some items of equipment that had not been installed when the previous articles were written, as well as some additional operations to fill the gaps in the big story.

It may be noted that Buick has developed three separate lines of equipment for cylinder blocks. Each performs the same operations on essentially the same types and makes of transfer machines. By the time this article is in print most of the major items of equipment should be in place and in full operation.

It is also of interest that this self-contained plant has departments for machining components such as —connecting rods, pistons, crankshafts, camshafts, bearing caps, valve gear, pistons, pins, etc. In addition, it houses all final assembly lines and block testing. When engines leave here they are ready for installation on the final assembly line in Flint as well as in assembly plants in other parts of the USA.

Among the major items of equipment installed on the cylinder block lines since the opening of the plant are the Cincinnati horizontal surface broaching machines, two being used on each line for the initial operations. Those who have followed modern engine machining practice will recall that recent installations have featured impressively long Cincinnati tunnel type equipment for broaching cylinder blocks. It is significant that the Buick equipment marks perhaps the first installation

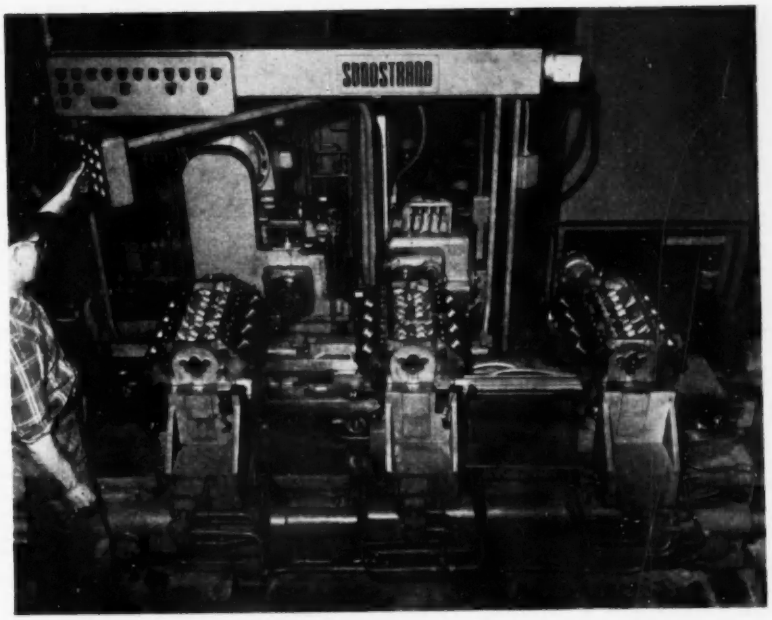
Close-up of work station in one of the Norton piston skirt grinders. It is fitted with the Norton Cam-O-Unit for producing the elliptical skirt formation.



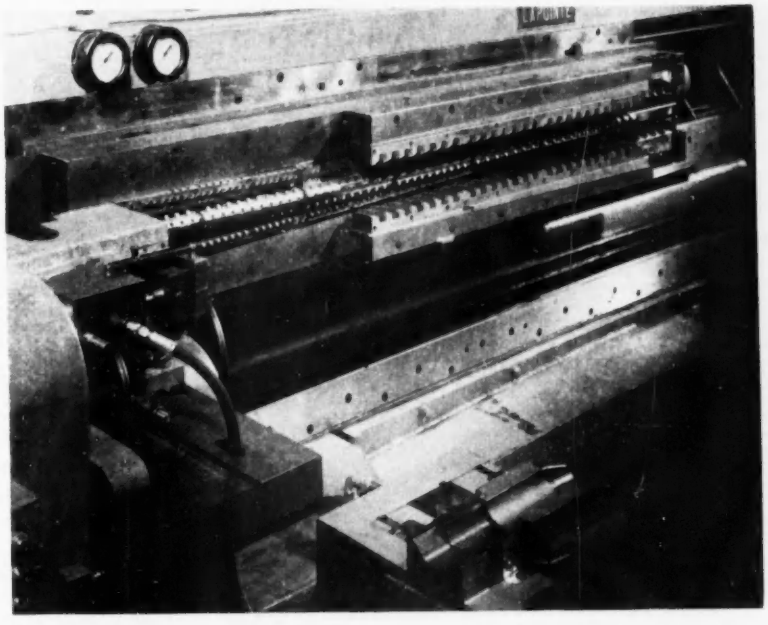
for V-8

PART III

By
Joseph Geschelin



Three-station Sundstrand machine setup for boring and facing the flywheel housing of conventional transmissions. As shown, the flywheel housing is presented as an assembly with a cylinder block. The station at the left does the facing; the center station does the step boring; while the one at the right is for inspection.



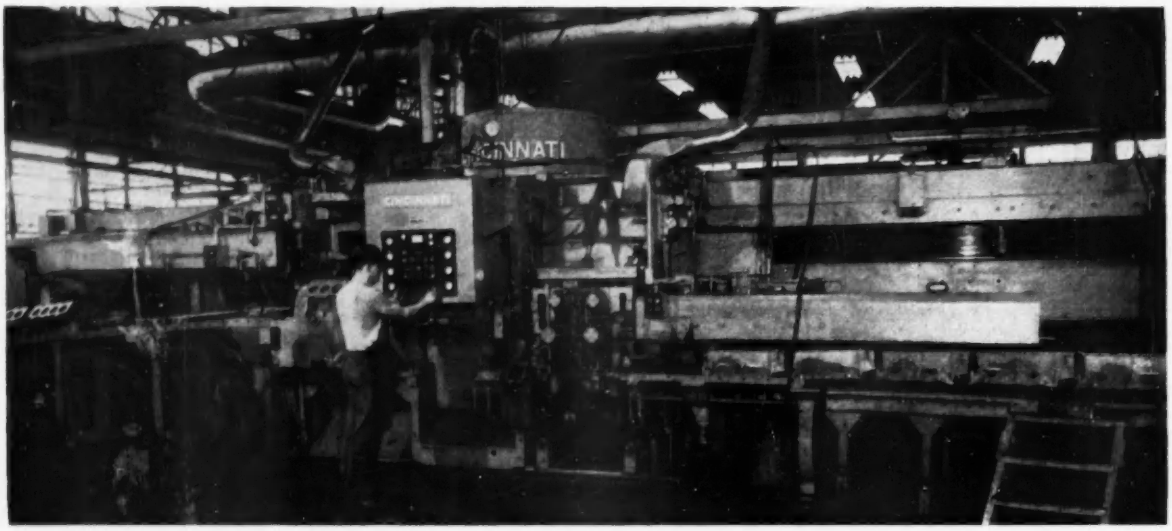
Here is a close-up of the tooling for surface broaching of main bearing cap set. This tooling is mounted on a LaPointe 15T, 120-in. stroke, DRH horizontal surface broaching machine.

of horizontal surface broaching machines for this purpose, employing the design characteristics of similar machines used up to now for surface broaching cylinder heads. Buick's management considers this an important advance in the art from the standpoint of productivity, machine and tool maintenance, and ease of chip disposal.

The two Cincinnati machines are similar in outward appearance, although the second unit in the line is larger and heavier and performs a more impressive function. The first operation machine handles the rough- and finish-broaching of the top surface (between the banks) as well as four locating lugs on the top side.

The second machine, of three-station type, performs two separate operations — first, surface broaching of the pan rail, bearing cap seats on the main bearing line, and rough-broaching of the half-round bores in the main bearings. This operation is handled in a separate fixture location. The second operation follows roll-over of the block in the central fixture to present the top face to the ram. At this point in the third station both banks are rough- and semi-finish-broached simultaneously.

Compactness and ruggedness of machine design has been achieved by providing an enormous ram which carries one set of broaching tools for the first operation at its lower level; and the second operation tooling on the upper level. Fixture positions are arranged



Probably the first installation of its kind, this is the enormous Cincinnati horizontal surface broaching machine installed at Buick for broaching cylinder blocks. It handles the following operations: surface broaching of the pan rail, main bearing cap seats, and rough-broaching of main bearing half-round in one operation; then rough- and semi-finish-broaching of cylinder banks at the third station.

in the same fashion. Thus the fixture for the pan rail end is mounted on a level below that of the fixture for the cylinder bank broaching.

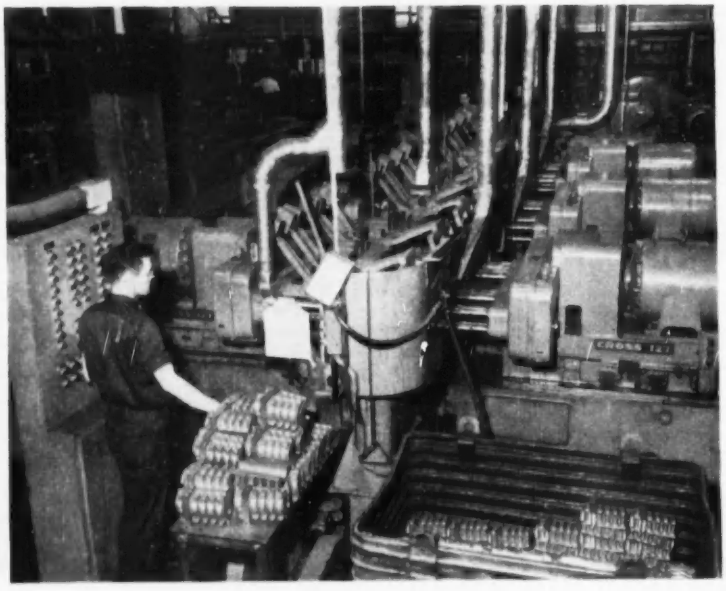
To reduce the load on the ram, one operation is performed with the ram moving in one direction; then the second operation is picked up on its return stroke. Consequently, this cycle involves cutting on both forward and return strokes. Tooling of the ram consists of the special staggered arrangement of individual tool bits of solid carbide which are so readily replaceable in the event of wear or breakage. Incidentally, the last, finishing section of the broaching tool for the cylinder banks is composed of solid blades of carbide which require replacement as a unit.

An excellently equipped connecting rod line is found in this plant, the first operation machine being an enormous Mattison five-wheel surface grinder for grinding both sides of rods, one side at a time. The big rotary table contains 30 fixtures for the first position, 30 for the second position.

Piston pin holes are drilled, then go to a group of vertical American broaching machines for hole broaching. As illustrated, each machine has a four-station fixture, holding four rods, while the ram is provided with four h-s-s round broaches for the operation.

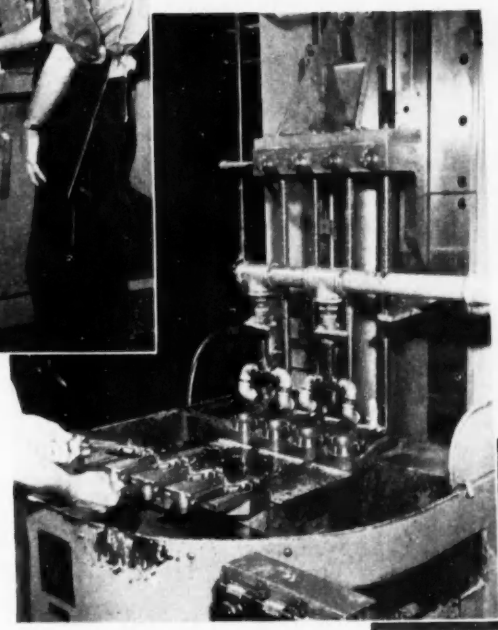
The big end half-bore and the joint face are broached in one of the large, vertical type LaPointe surface broaching machines.

Bolt holes at the big end of the rod are drilled, chamfered, and reamed in one setting in special Greenlee four - station machines, equipped with a trunnion type central fixture, holding two rods at each station. One station is used for loading and unloading. Drilling is done at the second station. The third station is tooled for forming an oil



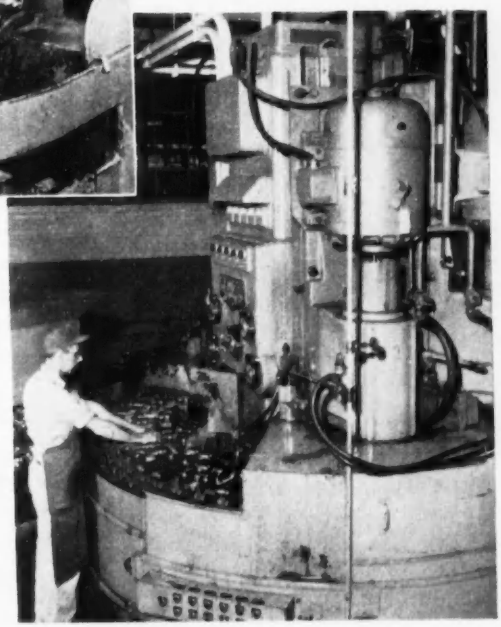
Looking down the Cross Transfer-matic machine which is tooled for machining main bearing cap sets. The loading station is in the foreground, showing main bearing cap castings ready for loading. The last station saws the casting into its five components.

Close-up at left shows trunnion fixture of one of the special Greenlee machines for drilling, chamfering, and reaming of bolt holes in the big end of connecting rods.



On the connecting rod line—an interesting American broach setup for broaching the pin bore. As shown at left, the machine takes four rods at a time, completing the operation with a set of four broaches.

On the connecting rod line—this big, five-wheel Mattison surface grinder (below) is tooled for grinding both sides of rod by double-indexing.



...BUICK

relief on one bolt hole and chamfering the other. Finish-reaming is done at the fourth station.

A large battery of Kingsbury machines is found in the plant, performing several different operations on connecting rods. One of the Kingsbury operations, as illustrated, does the drilling, spotfacing, and tapping of the pinch bolt hole. It is a six-station machine, with the sixth station for loading and unloading, provided with a six-station indexing table holding two rods at each station. The first two stations drill the 11/32-in. hole through in two steps. The third station drills the 17/64-in. hole; the fourth station spotfaces; while the fifth station does the tapping.

Another group of Kingsbury machines has been tooled for milling and chamfering the bearing lock and oil relief slot, and drilling a 5/32-in. hole at the big end of the rod. These too are of six-station type with loading and unloading at the sixth station.

As rods and caps are completed on the machine lines they come together at an assembly station and are assembled in sets. One of the interesting operations on the assembly is the precision-boring of both ends of connecting rods in a single setting in an Ex-Cell-O, double-end, heavy duty precision-borer.

Following this the crank bore in the large end is honed to a total tolerance of 0.0005 in. in a battery of the latest type six-station Micromatic Turret Hone machines, fitted with the Microsize attachment.

One of the interesting items of equipment on the piston line is the Norton cam grinder for producing the elliptically-ground piston skirt. A battery of these machines is fitted with the Norton Cam-O-Unit for producing the desired cam-grinding action.

Since a certain percentage of Buick cars still are ordered with conventional transmissions, arrangements have been made for boring and facing the fly-

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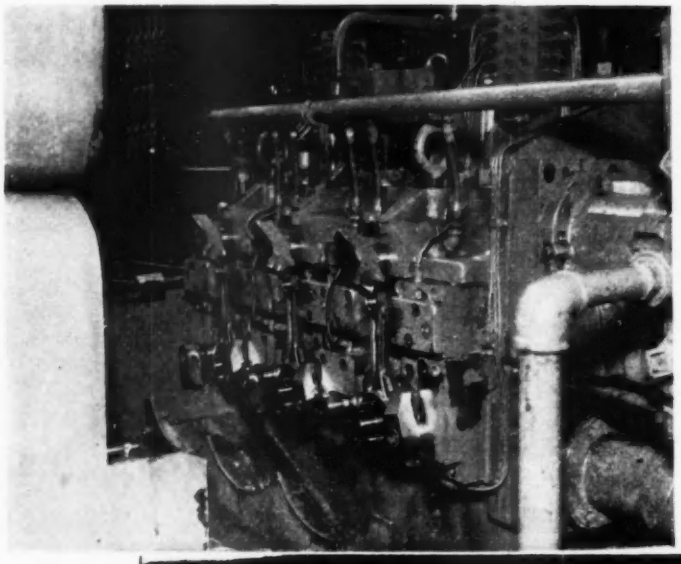
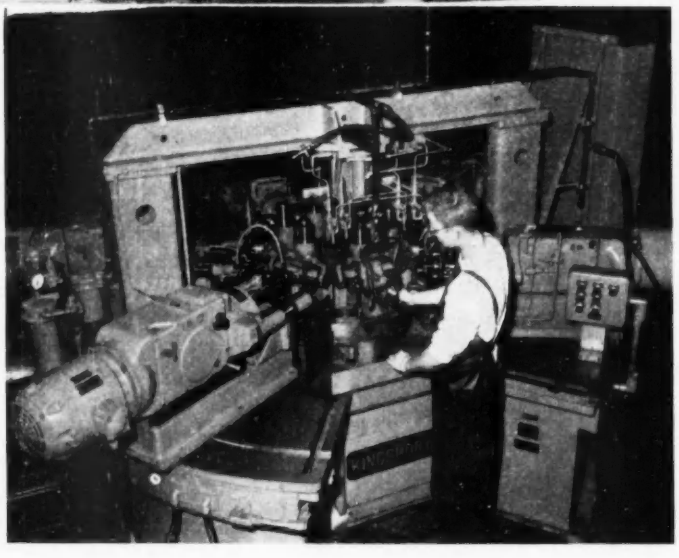


Close-up of work-holding fixture in one of the Ex-Cell-O double-end, heavy duty precision-boring machines on the connecting rod line. It does the precision-boring of both ends in one setting.



Connecting rod pinch bolt holes are drilled, spot-faced, and tapped in one setting in this Kingsbury multiple-station machine. Two rods are mounted at each fixture station as shown in lower illustration.

wheel housing when bolted to a cylinder block to assure precise alignment of the transmission input shaft and rear main bearing. This operation is performed in a three-station Sundstrand machine. It has two working stations and one inspection station. The first station is used to mill the outer face of the flywheel housing while the second station completes the bore, using a special stepped boring tool.

Some interesting tooling has been developed for the machining of main bearing caps. The set of five caps is made up in a single gray iron casting to facilitate handling on the machine line. The first operation is done in a horizontal type surface broaching machine supplied by LaPointe. It completes in one setting the broaching of the joint face, sides, chamfer, and broaching of the half-round. A noteworthy feature of the equipment is that the broaching tool for the half-round bore is fitted with replaceable inserted carbide bits, staggered around the periphery of the bar, instead of the conventional solid bar used heretofore.

Following this operation, the cap casting goes to a Cincinnati vertical Duplex broaching machine to complete the following detail operations — broach cork grooves, transfer slots, oil pump shaft clearance, and oil pump pad.

Complete machining of the main bearing caps, including sawing into five sections, is done in a special Cross Transfer-matic unit, illustrated here. Although it is an extremely compact machine, it handles two main bearing cap sets at a time in a setup comprising eight double stations. Briefly, the operations include —drilling, chamfering, and spotfacing of ten bearing cap holes; drilling the oil drain hole; drilling, chambering, and tapping two oil pan holes; milling bearing lock slots; sawing blocks into five caps and milling both ends.

Without going into the details of operations at each station, it is of interest that drilling of the 33/64-in. bolt holes is done in two steps — drilling half-way through at one station, then drilling through at a subsequent station. All operations on one cap set are repeated on the second cap set which goes through the machine at the same time.

At the 14th and 15th stations on the right hand side the blocks are sawn apart into their five component caps and both ends are milled.

This transfer machine has a total of 114 drilling spindles, one arbor holding ten milling cutters for notching, and one large arbor in the last unit for sawing the caps apart.

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Wide Variety of Metal-Working Machines Made in Belgium. Huge Machine Tool Exposition to Be Held at Brussels.

Belgian Machine Tool Industry

We recently received an interesting report concerning the machine tool industry in Belgium which gives an idea of the type of foreign competition with which American makers must deal. Largely, the machine tool industry in the country is grouped around Liege, Charleroi, and Brussels.

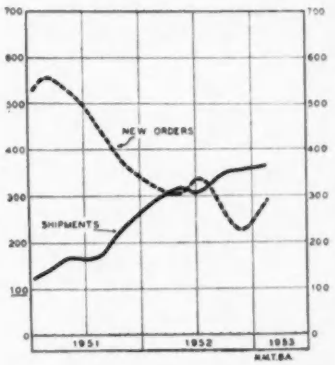
The Belgian machine-tool industry has developed within a complete group of metal manufacturing industries which employ approximately 190,000 persons, in addition to about 20,000 individual craftsmen. Some 4000 people are engaged in the production of metal-working machinery itself, and production runs around 10,000 tons of machine tools per year.

Covering a wide variety of machines, production ranges from small tool-sharpening machines to large planers and lathes, various types of presses, shearing machines, resistance welders, reaming machines, truing machines, drilling machines, etc.

Belgian makers are said to have paid a great deal of attention to the quality of cast iron and steel, and to the heat treatment of components. In regard to precision, the machine tools are reportedly built to standards drawn up by General Salmon and Prof. Schlesinger. These standards are claimed to be the maximum tolerances permitted for the different parts of machine tools after assembly. Belgian makers are also doing a great deal of work on carbide tooling in conjunction with higher cutting speeds.

Foreign Tool Show

The previous statements gave just a little background of the machine tool industry in the country which will house the 1953 European Machine Tool Exhibition. It will be held in Brussels from the 4th to the 13th of September. The Exhibition will be held in the Palais du Centenaire, and well over 500 companies representing some 15 nations are expected to display their wares.



Trends of new orders and shipments of machine tools. Average shipments 1945-46-47 equal 100.

Gear Index

Volume in the gearing industry is still on the increase as evidenced by a 36.8 per cent increase in April as compared with March. The index figure now stands at 217.1 based on the volume of 1947-49.

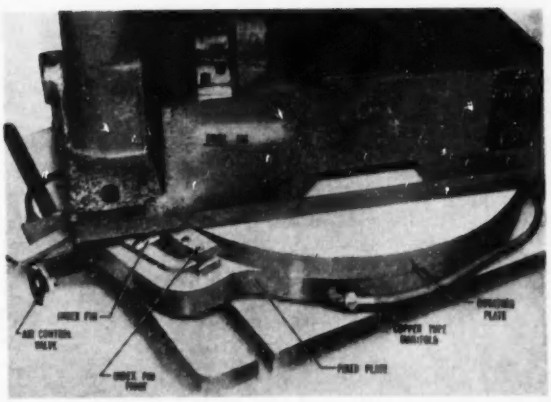
Automotive Automation

Westinghouse recently put on the road a Beaver bus with a special body carrying a display of electrical equipment used for automation. In the latter part of last month the coach toured several machine tool and allied plants in the Ohio and Indiana area. At each plant consecutive 1½ hr programs for groups of ten to 12 engineers were scheduled. In the next 14 months, the coach is expected to visit some 350 plants throughout the U. S.

Air Bearing

Out at Solar Aircraft, compressed air has been substituted for a conventional thrust bearing between a heavy rotating plate and a fixed base on a Natco multiple spindle drill. As shown in the illustration, the air thrust bearing is employed on the index table for the drill jig. A copper manifold tube is connected to a manually-operated air valve that controls the air supply. Tube tees located radially around the plates lead the air into a space between the moving plate and the fixed plate.

Operation of the bearing is as follows: Air at 90 psi is introduced to the manifold by opening the air valve. This causes the rotating plate to be raised approximately 0.005 in. The rotating plate is then moved to the next index point and the air valve is closed. Air in the system escapes and the rotating plate settles down on the base plate providing a solid support for the drilling operation.



Application of the air bearing at Solar Aircraft on a drill jig weighing about 200 lb.

NEW EQUIPMENT PLANT • PRODUCTION

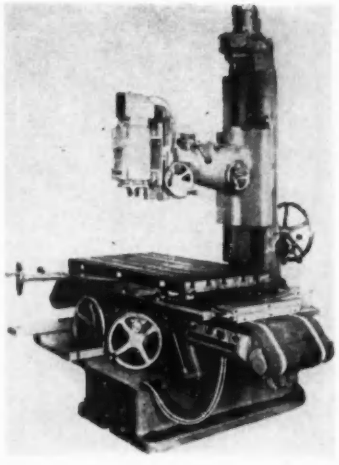
FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Milling Machine Features Large Worktable and Deep Throat

A patternmaker's milling machine, Bokoe Model 2, with an unusually large worktable and deep throat for machining many sizes and shapes of ferrous, non-ferrous and wood workpieces, is now distributed in the U. S.

Manual controls on the worktable provide for 28 in. transverse and 48 in. longitudinal movement. With automatic feed, longitudinal movement is infinitely variable from three to 58 in. Transverse and rotary movement are also provided by automatic feed. Maximum diameter of turntable work is 8½ ft. Depth of throat between column slide and spindle center is 35 in.

A wide range of settings and adjustments, as well as spindle speeds, are provided. The variable speed changer can be operated without stopping the machine. In addition to normal operation as a milling machine, the Bokoe can also be used as a radial drill. By turning the swivel column 180 deg, castings mounted on skids on the floor can be drilled.



Orban distributed Bokoe milling machine.

All operating controls and levers are easily accessible. Column and vertical slide are fitted on the base which also holds the longitudinal slide, cross-slide and worktable. Worktable can be swiveled for performing circular work. Accessories are available for adapting the machines to many requirements.

Bokoe milling machines are designed for standard American voltages and frequencies; calibrations and lead screws are in inches. *Kurt Orban Company, Inc.*

Circle E-1 on page 65 for more data

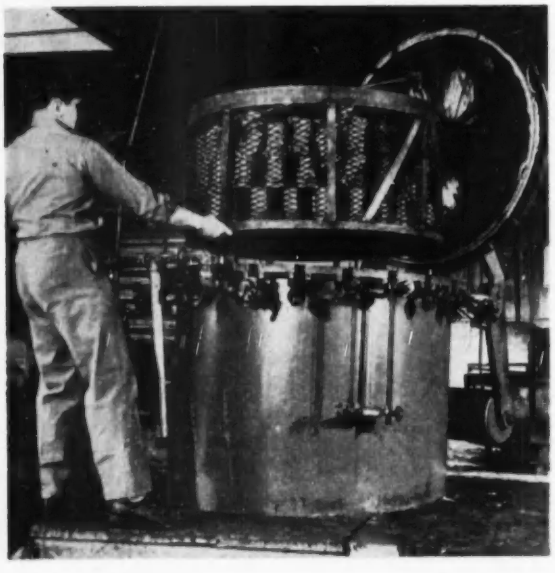
Impregnating Process Seals Powdered Metal Parts

Powdered metal parts are claimed to be made non-porous by an impregnating process recently developed. For this process a solid copolymer is used which is said to fill all pores, prevent corrosion, and permit plating. Excess resin is removed from the outside of the part with a cleaner that does not attack the impregnant.

Features of the product, 19V5, include constant viscosity through-out the operation, positive pore penetration, and it can be used for copper base alloys. The solvent utilized is non-inflammable and non-toxic. Material may be plated or anodized before or after being impregnated.

According to the maker, castings can be machined after the sealing operation without fouling tools. The colorless thermosetting copolymer has an intermediate temperature range from –75 F to 500 F with a constant heat resistance of 400 F. *American Metaseal Mfg. Corp.*

Circle E-2 on page 65 for more data

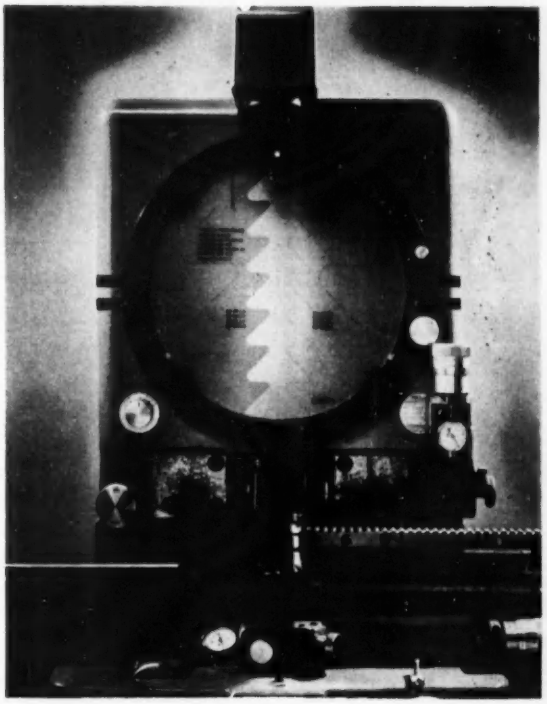


Castings being lowered into an autoclave for Metaseal impregnation.

Broaches Gaged by Optical Projection

Optical gaging is now being utilized for the checking of all teeth of broaches for tooth form, spacing, and wear for the entire length of a broach. The gage uses a specially designed broach locating fixture which is placed and locked on the work stage of a Model IIA Kodak contour projector. The base of this fixture is approximately 34-in. long; however, this can be made longer if necessary. On this base is mounted a broach carrying movable slide and indexing head.

As placed on the fixture, the broach rests against mounting blocks of the indexing slide member and against a magnetic stop at the end of the slide. The magnetic end stop is adjustable to allow for lateral adjustment of the broach if necessary without moving the entire fixture or work stage. When checking various teeth, the broach is indexed across the path of the optical system in accordance with positioned indexing notches. The indexing head is fixed to the base member of the fixture, and carries two special metal mirrors which can be moved as a unit in and out between the teeth of the broach to positive stops at each end of its travel. Positioning this mirror assembly against the forward stop places the mirrors on either side of a row of teeth for tooth to tooth inspection. Inadvertent forward thrust of the mirrors against the broach is prevented by a stop pin which must be raised in order to allow forward movement of the assembly toward the broach. Pulling the index handle first removes the mirror assembly from the broach and secondly pulls the stop from the index bar, in a double action, according to the manufacturer.



Optical gaging unit for broaches.

An adapter is supplied with this fixture which is inserted behind the standard 45 deg mirror attachment of the Kodak contour projector. This is used in order to extend forward the focal position for the broach. Light coming from the 1000 watt surface illuminator out of the optical system is directed by means of the 45 deg mirror attachment downward towards the two special metal mirrors as positioned flanking any one row of broach teeth. The light striking these mirrors is reflected toward the opposite metal mirror and then returned upward through the same original optical system. A silhouette of the tooth form is projected on to the viewing screen. *Optical Gaging Products, Inc.*

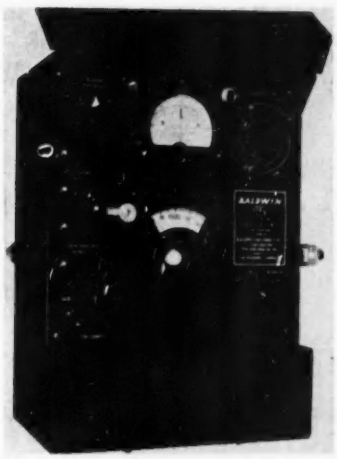
Circle E-3 on page 65 for more data

Portable Strain Indicator

A Model M portable SR-4 strain indicator has been announced. The instrument is designed for operation with either batteries or a-c power pack, which is optional equipment. The new a-c power pack unit fits into the battery compartment and is mounted on a separate back cover of the instrument case.

Model M is functionally identical to the previous Model L. Only changes are provision on the null indicator meter for checking a-c line voltage and addition of a fuse beside the meter to protect the circuit when using the a-c power pack.

The indicator reads directly in microinches per inch up to 30,000 microinches per inch ond can be used readily with an external Wheatstone bridge without modifying the internal circuit. It is also equipped with an oscilloscope connector jack to give access to a signal for measuring dynamic strains and for phase balancing the circuit when long unbalanced cables areused.



Baldwin portable strain indicator.

Measuring accuracy is within plus or minus 2.5 microinches per inch for the "thousands" step. Slide wire tolerance is plus or minus five microinches per inch and the gage factor adjustment is accurate to plus or minus ¼ per cent at any point. The instrument case is approximately six in. by nine in. by 12 in. *Baldwin-Lima-Hamilton Corp.*

Circle E-4 on page 65 for more data

(*Turn to page 58, please*)

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 65

(Continued from page 57)

Belt Grinder for Turbojet Blades and Buckets

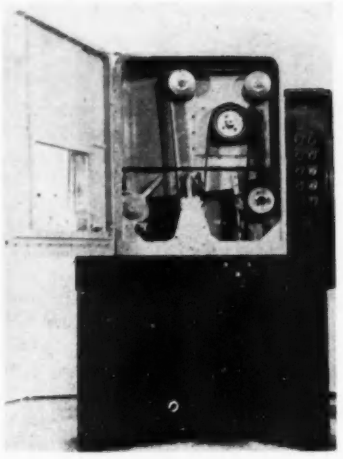
For grinding buckets and blades for aircraft gas turbines, a generating belt grinder has been designed and built. The machines, tooled for turbine rotor and stator parts, are said to remove stock from one side of blades at a rate of 0.001 in. to 0.003 in. per sec, so that an average cycle time of less than one min per side can be obtained with usual stock allowance. An 80-grit belt has been used on the rough or "semi-precision" Nimonic forgings to produce approximately a 50 microinch finish.

Design of the machine is said to incorporate a new approach to conjugate form grinding using an abrasive belt traveling between a master form and the work piece. The master form generates the desired contour as a result of the specific relative motion between it and the work piece. This motion is such that progressive contact of limited area results. A 15 hp motor supplies power for the machine.

The shape of the master form for each job is determined on the grinder. A master blade or bucket is placed in position on the machine, supported in the same way as in the actual engine, when possible. Then a blank faced with plastic material is inserted into the conjugate form position. Power sweep motion is then employed in conjunction with hand feed control so that the master blade generates its own conjugate form in the plastic. After being reproduced in steel to the required degree of accuracy, the master form is hardened; then either surface treated or plated to improve wear resistance.

The method is reported to make possible the rapid removal of sufficient stock to produce the required contours from comparatively rough work pieces, thus eliminating the need for expensive high-precision forgings or castings. An additional advantage is the elimination of the objectionable skin effects that are encountered on some forgings and castings.

There are two basic models. Model 4S is for concave shapes. Model 4T grinds convex and relatively flat surfaces. It is possible on some of the comparatively flat blades (many compressor blades, for example) to grind one side of the blade and one-half of the leading and trailing edges in one setting on Model 4T. A blade of this type can be ground complete (except for root contours) in two handlings. Reciprocation of the workpiece on Model 4T and of the cam assembly of Model 4S is hydraulic.



Interior of grinder shows belt path design.

Pressure is automatically reduced when the machines are not grinding.

Once the machines are set up, the operator loads a workpiece, presses the master cycle button and the operation is automatic to the point of removing the finished piece and inserting a new one. One part can be loaded into a cartridge or shuttle while another part is being ground in cases where it is desirable to check the workpiece position or size before or after grinding; work-holding means is easily cleaned or replaced. Sequence of events and motions is positive and independently adjustable where desirable. Feed rate, distance of travel, grinding force, etc.—are adjustable.

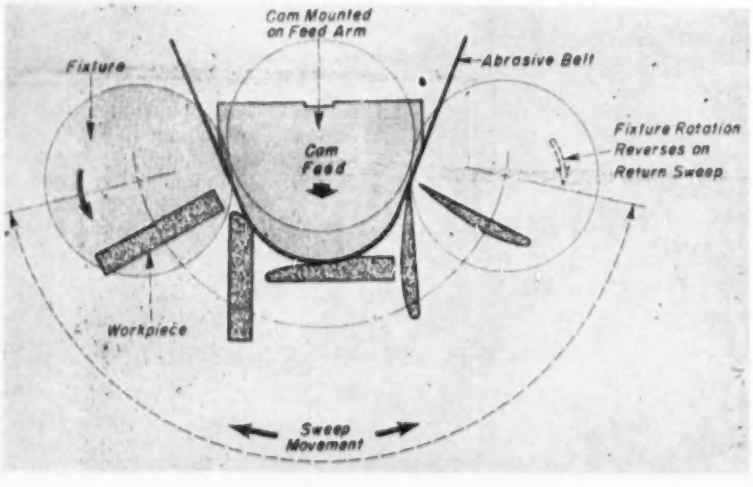
Unit construction is another feature of these machines. The base, electrical panel, hydraulic panel and grinding unit comprise the basic units.

A sandwich plate is used for the hydraulic panel on which all hydraulic valves are mounted (except the pilot reversing valve which is near the sweep assembly). Virtually all components used are Vickers, including the two hp motor-pump unit mounted adjacent to the hydraulic compartment for easy access and maintenance.

Push buttons are mounted directly on the electrical panel enclosure at the front of the machine. *Planet Products Corp.*

Circle E-5 on page 65 for more data

(*Turn to page 60, please*)



Planet blade and bucket grinder operation.

How times have changed!

for instance:

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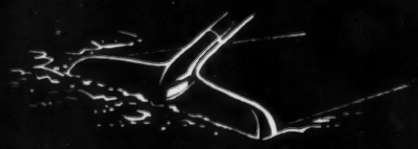
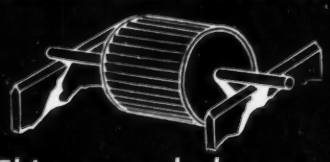
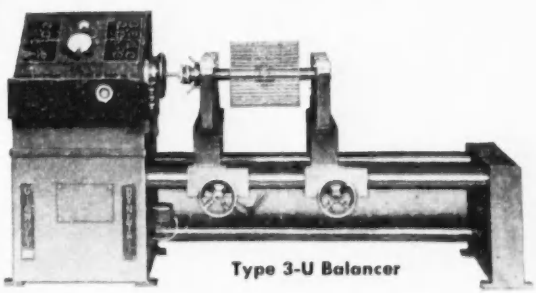


This was the best cleaner . . . . until we got **THIS.**

The old rub-a-dub washdays . . . . gave way to **THIS.**



This was a balancer . . . . . . until we built **THIS!**



Type 3-U Balancer

Any job worth doing is worth doing *right!* And with today's precision manufacture and high-speed rotating parts, that applies to balancing more emphatically than ever.

If your work involves balancing, do it the *modern* way—with Gisholt DYNETRIC Balancing Machines. Here's unrivaled speed that enables you to locate and measure unbalance in a matter of seconds—unequalled accuracy, capable of detecting vibrations as small as .000025".

Gisholt Balancers are available for handling all kinds of rotating parts, from a fraction of an ounce to many tons. Write us for a copy of the booklet STATIC & DYNAMIC BALANCING.

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NEW EQUIPMENT — PLANT · PRODUCTION

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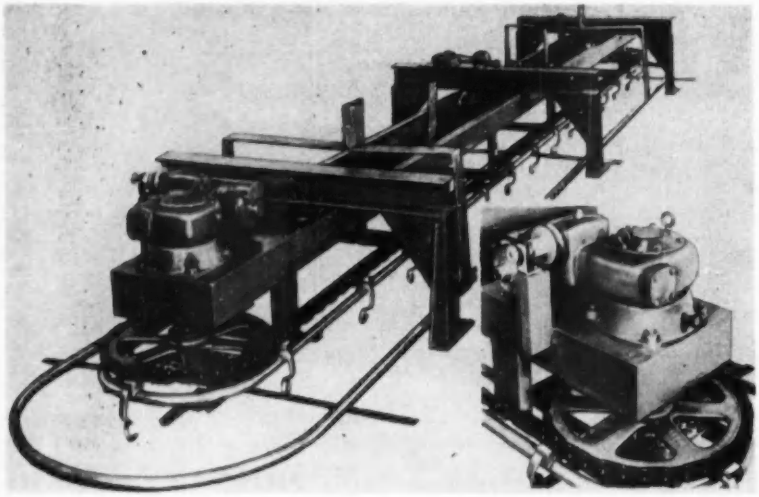
(*Continued from page* 58)

Plating System Is Semi-Automatic



Wagner semi-automatic plating equipment.

A "packaged" semi-automatic plating system to replace or augment still tank plating for the electroplating field has been put on the market. One advantage claimed for the semi-automatic unit is its versatility. When a run is completed (or between runs of a certain part), the system may be altered for a different job by shifting the "pusher shoes" to the desired spacing. Spacing to any dimension in two in. increments may be accomplished by removing pusher shoes. The second advantage stated for the equipment is in the reduction of maintenance costs; all wear points are lubricated, the standard roller chain is available everywhere, and the Micarta pusher shoes are said to last indefinitely. The variable speed control and drive are combined in one unit which may be replaced by removing a few hold-down bolts. V-belts are used for drive and agitating mechanisms. *Wagner Brothers, Inc.*

Circle E-6 on page 65 for more data

Instruments for Direct Measuring

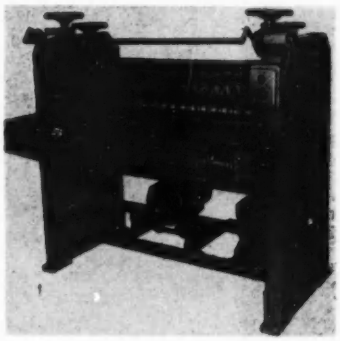
Precise straight line control, of many difficult to control variables in processing, is now said to be offered by the Panelmount Capacitrol Model 252P through the added Capaciline. "Straight line" control is accomplished by a resistor circuit of the built-in Capaciline which anticipates the control point. This action is claimed to prevent "over and under" run of the control point caused by various heat transfer lags.

Other features include compact design and plug-in unit construction. These instruments are used for indicating and controlling temperatures, voltage, speed, and other process variables.

Panelmount Capacitrols can be mounted in multiple unit instrument panels because of their 6¾ in. high and 19-1/16 in. wide front dimensions. *The Wheelco Instruments Div., Barber-Colman Co.*

Circle E-7 on page 65 for more data

Automatic Adhesive Spreader



Recently designed and built, a compound spreader applies adhesive in strip form to the top side of jute used for floor pads in automobiles.

Piano wire is used for the upper conveyor which drives the material through the glue roles. A steel mesh conveyor is used on the underside of the sheet to convey it through the machine. All rolls are chrome-plated.

This machine takes material up to 36 in. width at speeds of from 25 to 75 lfpm. Its weight is approximately 2800 lb, height 55 in., width 54 in., and depth 38 in. It is fully automatic. (Union Tool Co.)

Circle E-8 on page 65 for more data

Tube Bender

An air powered bending machine that automatically bends round tubing, light angles, channels and solid bars has been brought out.

Development of a completely automatic clamp and the addition of needle bearings on the head mount are claimed to allow as high as 1000 bends per hour with 1⅛ in. OD, 16-gage steel tubing.

In operation, the tube is slid over a mandrel; locked into position at the preadjusted stop; and 80 lb bending pressure is applied by a hand or foot air valve. The automatic clamp grips the tube while it is bent into shape. *Paul Machine Tool & Die Works*

Circle E-9 on page 65 for more data

(*Turn to page* 62, *please*)

Paul bending machine.

Is high capacity in small space your problem?

here's how makers of outboard motors solve it with **NEEDLE BEARINGS**

Leading manufacturers of outboard motors specify Torrington Needle Bearings because of their high radial load capacity, their compactness and light weight.

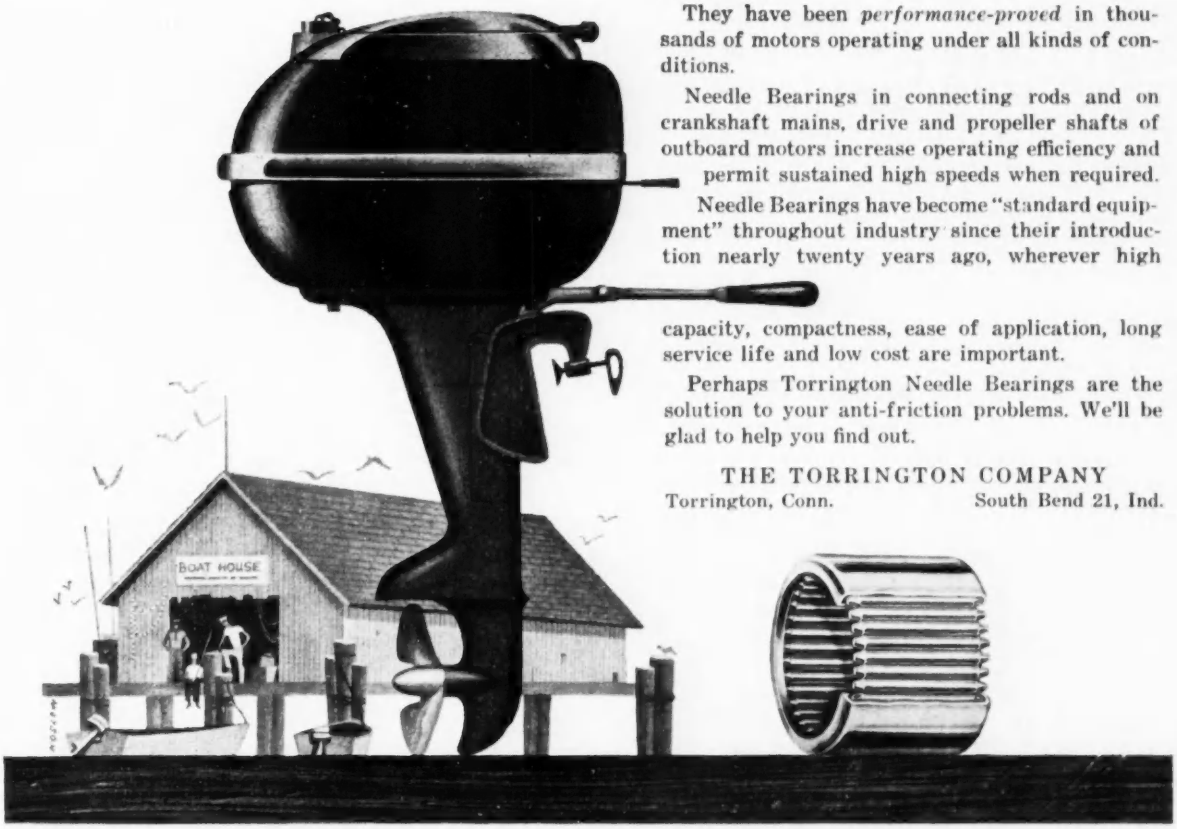
They have been *performance-proved* in thousands of motors operating under all kinds of conditions.

Needle Bearings in connecting rods and on crankshaft mains, drive and propeller shafts of outboard motors increase operating efficiency and permit sustained high speeds when required.

Needle Bearings have become "standard equipment" throughout industry since their introduction nearly twenty years ago, wherever high capacity, compactness, ease of application, long service life and low cost are important.

Perhaps Torrington Needle Bearings are the solution to your anti-friction problems. We'll be glad to help you find out.

THE TORRINGTON COMPANY
Torrington, Conn. South Bend 21, Ind.



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NEW EQUIPMENT PLANT · PRODUCTION

For additional information, please use postage-free reply card on page 65

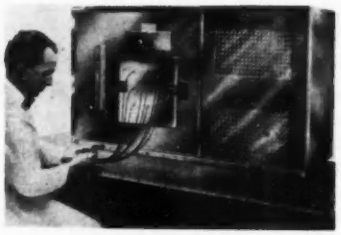
(*Continued from page 60*)

High-Low Temperature Bench Type Test Chamber

Now available is a high-low temperature bench-type test chamber which has been recently developed. Designed and developed primarily for a branch of the armed services, the unit is capable of extreme temperature ranges within a relatively short time. Temperatures range, on the standard unit, from −80 F., to +185 F. Rapid pull-down of temperature is one of the features offered in this model with the temperature pull-down to −80 F., requiring 30 min or less.

Test chamber dimensions are 12 in. by 12 in. by 12 in. Overall dimensions are 50 in. long, 26 in. high and 20 in. deep. Equipped with air-cooled compressors, the unit is quiet in operation. The application of heat is accomplished through the use of reverse cycle refrigeration. A blower is provided for even distribution of temperatures and greater testing accuracy. The door illustrated is a latch-type door which provides for complete removal of the door from the cabinet. This feature is for the use of a mounting board affixed to the back of the door on which component parts may be mounted for testing. Holes may be drilled through the door to provide for electrical contacts. A hinge type door is available with this model. *Industrial Freezer Div., Webber Manufacturing Co. Inc.*

Circle E-10 on page 65 for more data



Webber test chamber.

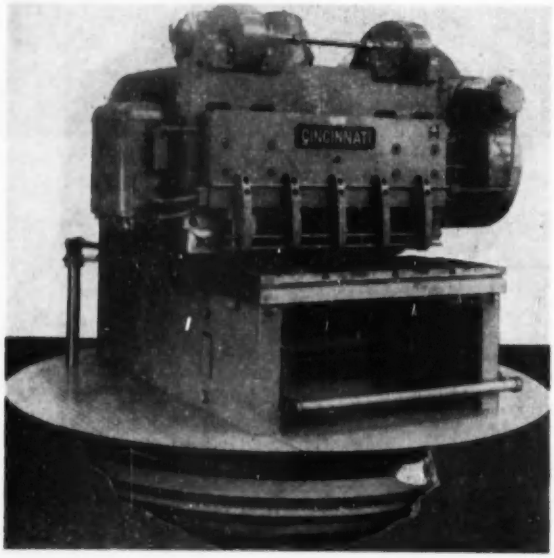
Shear for Mild Steel Up to One-In. Thick

A recently developed all steel shear is capable of cutting mild steel up to one in. thick and four ft long. It is mounted on a turntable that is retated by means of a circular rack and pinion. The shear may be set at different positions to eliminate as much handling of large plates and coiled stock as possible, and it can be turned to 90 deg either side of center.

Weight of the shear is 42,000 lb and it operates at 30 strokes per minute. It is equipped with a hinged back gage angle that permits the cutting of plates longer than the back gage range.

Additional features are a light beam shearing gage, ball transfers in the table, and air counterbalances on the ram. *Cincinnati Shaper Co.*

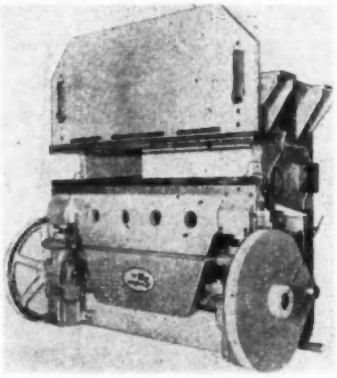
Circle E-11 on page 65 for more data



Cincinnati all steel shear.

400-Ton Press Brake

A 400-ton capacity press brake has been added to a line of sheet metal forming equipment. Designated the Model 400-PB-8, it will form steel up to ¾ in. in thickness and eight ft in width.



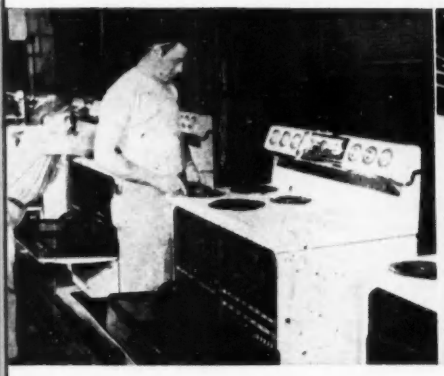
Struthers Wells press brake, Model 400-PB-8.

The Model 400-PB-8 press brake, one of a series of six in the 400 ton class, affords the operator complete control at all times with instant stopping of the ram at any point. It is provided with pneumatic clutch and separate brake, operating controls for cycling and inching, plus control for a single work stroke with return of the ram to "up"position.

Design of the press brake is such that the force is exerted along the centerline of the side frame and directly down to the bed on its supporting leg of the frame. This straight-line power push is claimed to eliminate twisting of the side frame, minimize deflection and help maintain alignment between ram and bed. *Struthers Wells Corp.*

Circle E-12 on page 65 for more data

SILASTIC helps Westinghouse score another FIRST...*
"COOKING without LOOKING"



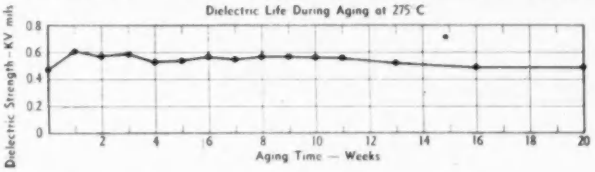
Engineers have been working for years to make a heat control system for electric range surface units that would forever banish pot watching. But it took Westinghouse, using a bit of Silastic, a thermistor, and a few relays and vacuum tubes, to perfect the "Electronic Eye." This heat control system regulates the temperature so accurately that food can be warmed, boiled or fried without danger of burning or scorching—even if all the water is boiled away. The heart of the temperature measuring device, the thermistor, is embedded in Silastic paste for protection and heat transfer. Flexible Silastic insulated cable is used to connect the thermistor to the exterior wiring, and the Electronic Eye itself is isolated in the center of a flexible Silastic diaphragm. The Silastic components have stood up under exposure to boiling water, oil, grease, coffee and syrup, as well as accelerated life testing equivalent to 15 years of actual service.

Performance proves...

SILASTIC works

where other materials fail!

Many of the most able designers, like those Westinghouse men who made automatic cooking a practical reality, save time and money by trying Silastic first when they need rubbery properties at temperatures far above or below the limits of any ordinary rubber. And exceptional stability at both high and low temperatures is combined in Silastic with excellent resistance to outdoor weathering and good resistance to a variety of hot oils and chemicals. Further proof of the inherent stability of Silastic is given in this small graph showing the effect of aging at 275°C (527°F) on the dielectric strength of Silastic.



Dielectric strength measured with ¼ inch electrodes in air on two layers of Silastic R Tape, for example, average 0.475 KV per mil. After 20 weeks of continuous aging at 275°C with both surfaces exposed in an air circulating oven, dielectric strength gradually decreased from a high of 0.601 to 0.485 KV per mil.

That's the kind of performance that makes Silastic, the Dow Corning silicone rubber, unique among all rubbery materials. When you need rubbery properties at temperatures above 150°F or below —40°F, or excellent dielectric properties in a resilient and flexible material ***specify Silastic.***

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- ☐ "What's A Silicone?", your new 32-page booklet on silicone products and applications.

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NEW PRODUCTS

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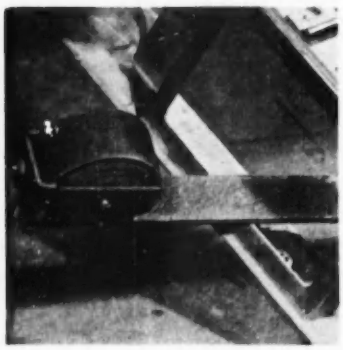


Continuous-Feed Abrasive File for Metalworking

Recently announced is a file that is used like a conventional metal file, but with a cutting surface that feeds from a coated abrasive roll. Called Red Flash, the hand tool is designed for deburring and other filing and finishing operations throughout the metalworking field.

Featuring an 11-in. stroke, the file holds a roll of more than six ft of abrasive cloth that is dispensed as needed to provide a fresh surface and to maintain peak cutting efficiency at all times and under all conditions.

Other advantages of the new tool are said to be faster cutting, increased versatility through a wide choice of abrasive grits, and greater economy. Only the cutting surface, rather than the entire file, is replaced when it becomes dull.

The file comes in one and 1½-in. widths with a Three-M-Ite grit 80 abrasive cloth roll. *Minnesota Mining and Manufacturing Co.*

Circle P-6 on page 65 for more data

Electric Plant for Portable and Semi-Portable Jobs

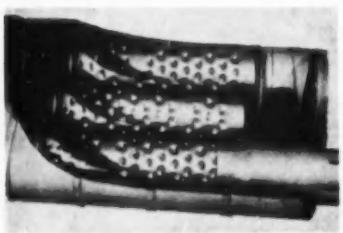
Recently announced is an electric plant that is said to be specially designed for various portable and semi-portable jobs requiring electric power generated at the site. Generating 1000 w, the new plant is designated as Model 1A21.

The unit is automatic, starting when any lamp bulb (40 w or larger), appliance, or motor connected to the plant is turned on. It automatically stops when all loads are cut off.

The plant is made in a type which starts and shuts down as the load requires, a portable one, and a push-button unit. All are available for gasoline or natural gas operation.

It is claimed that many mechanical improvements have been incorporated into the new unit, such as the elimination of interference with radio and improved voltage and frequency regulation. *Kohler Co.*

Circle P-7 on page 65 for more data

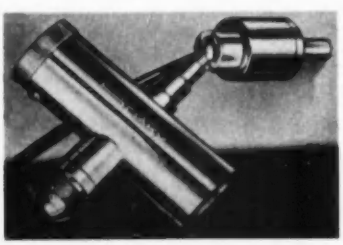


Spiral Muffler for Self-Cleaning Action

Currently available is a muffler with a continuous spiral four-ply interlocked metal, reinforced rib construction which is said to give it unusual strength and rigidity.

In addition to the spiral shell construction, the muffler also has a self-cleaning scoop action built into the silencing units. This feature is said to afford maximum silencing and smoother motor operation. It is claimed that scoops cannot clog, thus maintaining minimum back pressure for which the unit was designed. *Pratt Industries Div., Formed Tubes, Inc.*

Circle P-8 on page 65 for more data



Locating Spotlight for Blind Operations

Now on the market is a locating spotlight which is said to enable production machine operators to position accurately work in blind operations on all types of equipment. It reportedly eliminates the necessity for fixtures and guides in many cases.

The unit directs an intense pin point beam of light on the stationary member of the machine. The light is reportedly visible under all shop conditions on all materials, yet its brightness will not cause eyestrain. *Sciaky Bros., Inc.*

Circle P-9 on page 65 for more data
(*Turn to page* 85, *please*)

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

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FREE LITERATURE

Aluminum Welding

Recently published is a 186-page process manual on welding, brazing, and soldering aluminum. It contains material on 34 processes suitable for these operations on aluminum and its alloys. Requests for copies must be made on company letterheads. *Desk PR, Reynolds Metals Co., 2500 South Third St., Louisville 1, Ky.*

Materials Handling

Now available is a book which combines Catalogs 26, 28, 29, 32, 33, and 34 on an extensive line of electric, hand lift and floor trucks, stackers, portable cranes, and storage racks. *Lewis-Shepard Products, Inc.*

Circle L-1 on postcard for free copy

Auxiliary Transmission

Now available is a brochure on a rapid forward and reverse transmission in several models for use with various types of winches. *Tel-E-Lect Products, Inc.*

Circle L-2 on postcard for free copy

Vacuum Leak Detector

Fresh off the press is a brochure on a small bench-type vacuum leak detector with a self-contained vacuum pump. *Whittington Pump & Engineering Corp.*

Circle L-3 on postcard for free copy

Aircraft Hardware

Recently issued is Catalog No. 21a on aircraft hardware. The first section describes aircraft hardware distributed by the publisher, while the back section contains 184 reprints of original AN specifications. Requests for copies should be made on company letterheads. *Air Associates, Inc., Dept. AD, Teterboro, N. J.*

Industrial Products

Recently released is a booklet on an extensive array of industrial products, such as electron microscopes, vacuum systems, metal detectors, high-frequency generators, etc. *Industrial Equipment Section, Engineering Products Dept., Radio Corp. of America.*

Circle L-4 on postcard for free copy

Loading Ramps

Bulletin DB-211 describes a line of magnesium mobile ramps for loading freight cars. *Magline, Inc.*

Circle L-5 on postcard for free copy

Spiral Tubing

Ready for distribution is a brochure on tubing with spiral construction which is said to combine light weight and strength with low cost. *Pratt Industries Div., Formed Tubes, Inc.*

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(Please turn page)

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6/15/53

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L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
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L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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Fibre Receptacles

Catalog R-52 covers a line of fibre receptacles, such as trucks, trays, boxes, baskets, cans, and barrels for industrial use. *Continental-Diamond Fibre Co.*

Circle L-7 on postcard for free copy

Speed Truck and Tractor

Bulletin ST-4 describes Model 2500 speed truck for many special plant uses and Model 3600 tractor for efficient materials handling. *Kalamazoo Manufacturing Co.*

Circle L-8 on postcard for free copy

Strap Dispenser

Now available is a leaflet on Model DP power strap dispenser for cutting straps to length quickly and easily. *Signode Steel Strapping Co.*

Circle L-9 on postcard for free copy

Engine Bearings

Vol. 39, No. 5 of "Lubrication" contains a complete article on automotive engine bearings and their proper lubrication. *The Texas Co.*

Circle L-10 on postcard for free copy

Socket Screw Calculator

Ready for distribution is a pocket-size, slide-rule type socket screw calculator for figuring diameters, lengths, socket dimensions, threads, and drill sizes. *Standard Pressed Steel Co.*

Circle L-11 on postcard for free copy

USE THIS POSTCARD

Titanium Data

Recently released is a booklet on the properties of titanium and titanium alloys. *Mallory-Sharon Titanium Corp.*

Circle L-12 on postcard for free copy

Gear-Motors

Now available is a 16-page publication (GEA-1437H) which describes the function, design, and application of gear-motors. *General Electric Co.*

Circle L-13 on postcard for free copy

Air Drying

Now available is a folder to enable plant supervisors to determine the minimum dehumidifying equipment and capacity needed to eliminate moisture problems. *Air Conditioning Div., Remington Corp.*

Circle L-14 on postcard for free copy

Electric Furnaces

Bulletin HD-153 describes a line of electric furnaces using silicon carbide heating elements that provide temperatures up to 2600 F and higher in special cases. *Hevi Duty Electric Co.*

Circle L-15 on postcard for free copy

Speed Drive

Bulletin D-2102 describes an improved electronic adjustable-speed drive of from ¾ to three-hp designed for powering a wide range of small industrial equipment. *Reliance Electric & Engineering Co.*

Circle L-16 on postcard for free copy

Hydraulic Pumps

Recently released is a brochure (A-5206) on a line of 34 standard sizes of fixed displacement hydraulic pumps. *Vickers, Inc.*

Circle L-17 on postcard for free copy

Grinding-Lapping Units

Catalog 1843-12 covers a complete line of grinding and lapping machines. *Norton Co.*

Circle L-18 on postcard for free copy

Industrial Controls

Catalog No. 8305 describes and illustrates non-indicating electric, electronic and pneumatic controllers for temperature, pressure and humidity. It also shows pneumatic and electric valves, switches and relays. *Industrial Div., Minneapolis-Honeywell Regulator Co.*

Circle L-19 on postcard for free copy

Barrel Finishing

Recently released is a 16-page manual on barrel finishing processes. Use of the Honite low-pressure, random honing process is discussed in detail. *Minnesota Mining and Manufacturing Co.*

Circle L-20 on postcard for free copy

(*See preceding page*)

THIS POSTCARD VOID AFTER AUG. 15, 1953

Please send me additional free information on the items described in this issue of AUTOMOTIVE INDUSTRIES, the code numbers of which I have circled below:

9/15/53

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L-1	L-7	L-13	L-19	E-1	E-7	E-13	E-19	P-1	P-7	P-13	P-19	P-25
L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
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CONTINENTAL'S PROOF BOOK

HENRY C. JONES

Chief of Material for Convair's Fort Worth division. His supervision of over 800 people in this department includes responsibility for more than 45,000 items. Over $200,000,000 has been spent by his department during the B-36 production program.

CONVAIR

A Consolidated Vultee Aircraft Corporation, Fort Worth, Texas

May 7, 1953

Continental Screw Company
New Bedford, Massachusetts

Gentlemen:

At Convair's Fort Worth division, it is the practice to periodically review our 2,196 B-36 subcontractors and suppliers in 38 states.

Recently, we conducted a survey among fastener manufacturers to determine how they were meeting quality standards and delivery schedules. You will be glad to know that the following facts were developed concerning your company:

Screws, Hi-Shear rivets, and other fasteners made by Continental are used throughout the B-36 bomber in varied applications. Our quality control records indicate your screws and rivets have a very high quality rating. There have been no rejections because of faulty workmanship--a factor of supreme importance in this business of aircraft manufacturing.

Continental has been able to maintain deliveries in a very satisfactory manner despite the many difficulties encountered during the past several years. In shortage situations, Convair has been able to receive expedited shipments from you.

In the past year, Convair has been going direct to the manufacturer more and more for purchases on volume items. The direct purchases of both your screws and Hi-Shear rivets show a considerable increase in recent months.

I sincerely hope that the fine relationship between our companies will continue through the years.

Sincerely yours,

Henry C. Jones

Henry C. Jones
Chief of Material
Fort Worth Division

You too can count on Continental®

CONTINENTAL SCREW COMPANY INC. 1904

Manufacturers of HOLTITE Fastenings For Every Purpose

CONTINENTAL SCREW COMPANY, NEW BEDFORD, MASS., U.S.A.

NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Landing Speed Indicator

Recently developed is an instrument which is said to give direct indication of the critical speed ranges during take-off and climb or in the landing approach.

The instrument, called a landing speed indicator, reportedly provides direct, instantaneous reading of what the pilot must now do through a series of mental or slide rule calculations which must then be interpreted in terms of air speed indications. It is claimed to be suitable for use in both piston and jet aircraft.

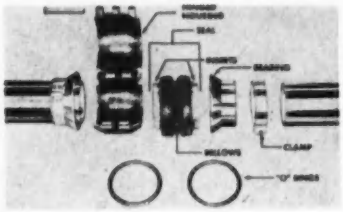
Safe Flight landing speed indicator.

The device consists of a standard-sized instrument mounted on the instrument panel and a sensing unit mounted below the wing's leading edge. The panel unit has a single indicating pointer which moves through an arc of 75 deg marked by segments colored red, white, and green.

When the plane is flown in a landing approach so that the pointer remains centered, the approach speed is aerodynamically perfect for a safe approach and flare out with a minimum landing run. It takes into consideration the factors of gross weight, flap setting and landing gear configuration.

The red and green segments of the device also provide valuable information. If the pilot sees the needle in or near the red sector, he knows he has not reached airborne speed (V_2) for take-off or that his approach speed is too slow for the landing. The green sector shows that he has excessive approach speed. *Safe Flight Instrument Corp.*

Circle P-1 on page 65 for more data



Aeroquip Flex Joint.

Fuel Line Joint

Introduced recently is a flexible joint for aircraft fuel lines to permit fluid-tight connections between two pieces of metal tubing.

Heart of the unit, known as Flex Joint, is a synthetic rubber bellows bonded to aluminum inserts at both ends. The bellows permit relative motion of the inserts, and the inserts, in turn, contain two O-rings to seal against the tubing. Completing the assembly are a pair of bearings and clamps, and a housing.

A two-in. size is now in production, and other sizes to accommodate one through four-in. tubing will follow. *Aeroquip Corp.*

Circle P-2 on page 65 for more data

Cockpit Covering

Now available to the civilian aircraft industry is a special paulin material for cockpits. It is designed to eliminate the clouding of plastic sections of planes which results from the impact of the hot sun. The aluminum-coated material is available in 50 and 54-in. widths. *Fabrics Div., E. I. du Pont de Nemours and Co.*

Circle P-3 on page 65 for more data

Solar engine pressure control.

Engine Pressure Control

Recently announced is a device that is said to make the operation of high-speed jet aircraft easier and safer. Known as the Microjet, it senses engine pressures and replaces complicated electronic equipment, according to the manufacturer.

The pneumatically-operated unit, when in action on a jet engine, computes by itself under all flight conditions exactly what the turbine discharge pressure should be. At the same time it notes any error between the actual engine pressure and what it should be. If there is an error, the device automatically sends out electrical signals to other engine controls which correct the pressure conditions. *Solar Aircraft Co.*

Circle P-4 on page 65 for more data

Nickel Sheet Material

Now available is a porous, silicone-treated nickel sheet material which reportedly will not pass water at less than three psi differential, but which will pass air freely.

It was developed to enclose delicate electronic equipment, aircraft instruments, etc. The material is available in sheet form, can be cut to size and form required, and can be welded to solid threaded components or other fittings for fastening to the equipment. *Micro Metallic Corp.*

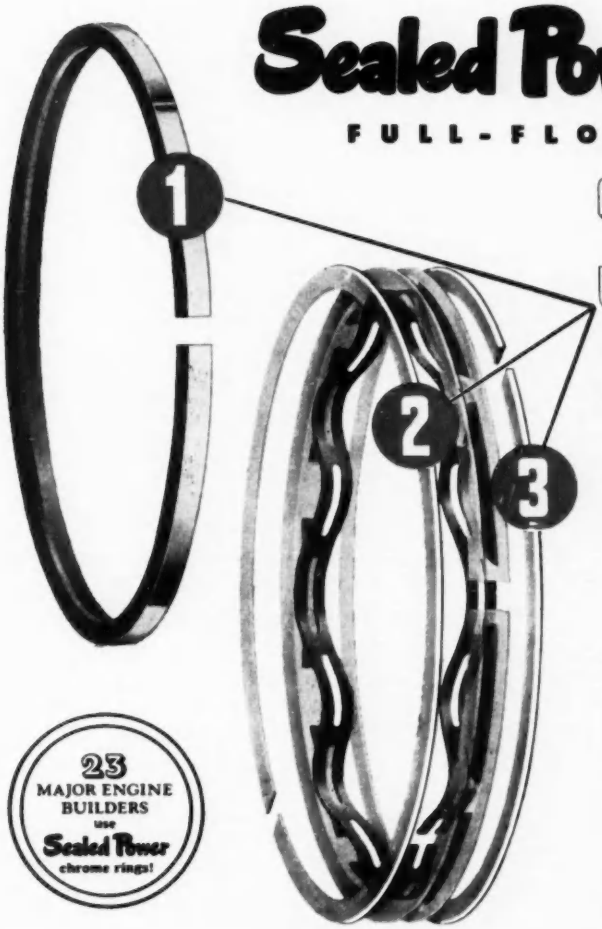
Circle P-5 on page 65 for more data

√ Better than any ring set without CHROME

√ Better than any other CHROME ring set

Sealed Power KromeX

FULL-FLOW RING SETS



3 vital surfaces are CHROME protected

Top Compression Ring of chrome-alloy cast iron has solid chrome face, factory-lapped to a light-tight finish, with sides Granosealed for greater flexibility.

MD-50 Steel Oil Ring with the Full-Flow Spring has chrome faced side rails for double mileage, with sides Granosealed for greater flexibility.

All rings in Sealed Power KromeX Ring Sets are beveled or tapered to thread-line contact for quicker seating and blow-by control.

23 MAJOR ENGINE BUILDERS use Sealed Power chrome rings!

Best for Fighting Heat, Friction, Corrosion, Abrasion

Sealed Power Piston Rings

SEALED POWER CORPORATION • MUSKEGON, MICHIGAN

Sole manufacturers of KromeX Ring Sets, MD-50 Steel Oil Ring, Full-Flow Spring, Flex-S Flexible Oil Ring, and GI-60 Groove Inserts.
Leading Producer of Automatic Transmission Rings, Power Steering Rings and Non-Spin Oil Rings.

The BUSINESS PULSE

Industrial Production Near All-Time High. Dollar Value of New Heavy Construction Contracts Continues to Climb. Moderate Decline in Retail Sales Volume. Military Spending to Rise During Coming Months.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Momentum Expected to Continue

Business activity is generally holding at near-record levels, and there is every indication that the underlying momentum in the current situation will carry trade and industry along on a very high plane for several months at least.

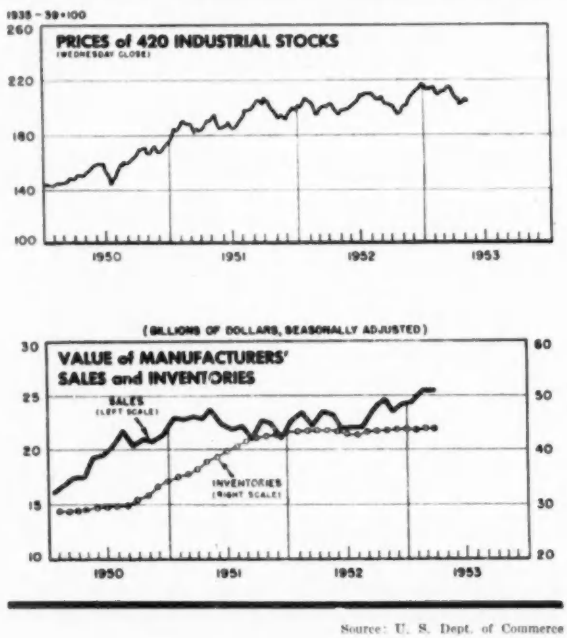
Industrial production continues at a truly phenomenal rate, and appears to be only slightly below the all-time peak reached in the final months of 1943. Secretary of Commerce Sinclair Weeks has termed the employment picture "extremely favorable," reporting that the number of unemployed is virtually at the practical minimum. Personal income still seems to be inching upward, suggesting that the second-quarter total will be moderately above that for the first three months of the year.

At the heart of the production boom is the sustained demand for steel. Mills have been maintaining operations close to theoretical capacity, and many of them reportedly are already fully booked for the third quarter of the year. The larger automobile companies —and other important consumers as well—have not been able to secure promises for all the steel they think they will need for the second half, and some of them are consequently extending conversion contracts so as to supplement mill deliveries. Steel producers report the receipt of a few cancellation notices, but not in substantial volume. The consensus now is that if a downturn in operating rates does occur in the fourth quarter of the year, it will be of but limited magnitude.

The automobile companies have been maintaining a remarkable output rate since the beginning of the year, and their requirements have of course been an important factor in keeping the steel situation so tight. By the middle of May, manufacturers had already turned out their three-millionth vehicle, about eight weeks in advance of its 1952 counterpart. Prospects took a turn for the worse during May, however, as production schedules were progressively affected by labor disputes in plants supplying parts. Assembly operations of a number of manufacturers were slowed, and some plants were forced to shut down entirely. However, the labor-management tension which had been building up in the industry seems to have been considerably relieved by agreements reached late in May between the three largest automobile companies and the United Auto Workers, CIO, on revisions of five-year contracts.

(*Turn to page 80, please*)

Selected Business Indicators



Source: U. S. Dept. of Commerce

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BRIGGS & STRATTON

...and equipped with

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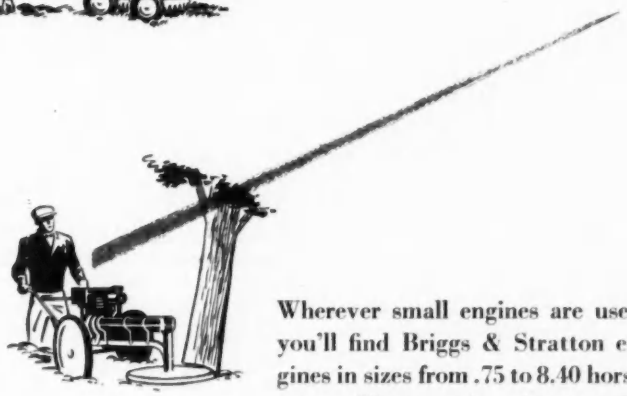

Wherever small engines are used, you'll find Briggs & Stratton engines in sizes from .75 to 8.40 horsepower. These engines have world-wide reputations for dependability, economy, and versatility.

For many years The Briggs & Stratton Corporation has used valves designed, engineered, and produced by the Valve Division of Thompson Products, Inc.

What Briggs & Stratton and other leading engine manufacturers in all fields have done, you can do . . . count on Thompson's Valve Division for engineering leadership.

VALVE DIVISION

Thompson Products, Inc.

CLEVELAND 17, OHIO

AIR BRIEFS

By ROBERT McLARREN

Air Power Debate

Washington observers are confidently standing by for the most explosive Air Power Debate since the "B-36 Hearings" of 1949, which produced the "revolt of the admirals." And one of the central figures of that fight, Admiral Arthur W. Radford, may well be in the thick of this one as Chairman of the Joint Chiefs of Staff, a post for which he is nominated by President Eisenhower. The debate centers about the size of the U. S. Air Force. Defense Secretary Wilson wants the USAF budget cut; Air Power advocates of both parties want it to stay where it is.

Wilson's Thinking

The new Secretary of Defense, who enjoys the complete support of President Eisenhower and thus speaks for the new Administration, has displayed a philosophy of national defense procurement entirely at odds with the Truman-Lovett-Finletter program. This official Government policy embraced three basic ideas: (1) the production base should be expanded through the creation and maintenance of "second sources" for all major defense items, (2) the USAF should have 143 combat wings in a state of readiness as the minimum air force essential for national defense, and (3) this 143-wing force should be in being no later than Dec. 31, 1955—a date progressively postponed through "stretchouts" from the original target of June 30, 1954, a date selected by the Joint Chiefs of Staff in 1950 as the earliest at which the Russians would be capable of mounting an all-out war. Wilson (and Eisenhower) quarrel with all three of these concepts and believe, instead, that (1) the "second source" concept is needlessly expensive and only the most efficient single producers should receive the business, (2) the USAF needs only 120 wings for adequate national defense, and (3) no "target date" need be selected but, instead, a continuous "posture of defense" be maintained.

The New Budget

On these premises, Wilson proposes to make the following cuts in the Truman Air Force budget: reduce Air Force cash for aircraft procurement from $7 billion to $6.3 billion; reduce Air Force money for new procurement from $6.7 billion to $3.5 billion, and reduce the total USAF fiscal 1954 budget from $16.8 billion to $11.7 billion. These reductions mean that the Air Force can have available only 120 combat wings by July 1, 1956.

Lightweight Fighters

The hue and cry over the mounting weight and complexity of the modern combat aircraft is finding recognition in the Navy carrier fighter field, at least. The Bureau of Aeronautics has awarded a contract to Douglas Aircraft Co. for the design and construction of an XF5D-1, which is a light-weight version of the XF4D-1 Skyray delta-wing carrier interceptor. Significantly, both aircraft are the work of E. H. Heinemann, El Segundo Division chief engineer, who has been one of the spokesmen for light-weight design. Chance Vought Aircraft Division, United Aircraft Corp., has also received a contract for a new carrier fighter in competition with 18 other designs by eight manufacturers. While no details on this new fighter have been released, it is believed to be a lightweight version of the tailless F7U Cutlass design, now in quantity production at Dallas, Tex. The Air Force has placed a contract with Lockheed for a light-weight XF-104 fighter plane and is examining other light-weight design proposals. Meanwhile, however, Air Force advisor Jimmy Doolittle, writing in *Collier's*, presents the case for the current complexity of modern combat aircraft and defends their heavy electronic and equipment load as essential.

Stratojet Records

The Air Force has suddenly revealed some year-old performances of the Boeing B-47 Stratojet bomber, which have been kept secret until now. Two B-47's have flown the Atlantic, making the 3120-mile flight from Limestone, Maine, to Fairford, England, non-stop and without flight refueling in 5 hr, 38 min, an average speed of 555 mph. Another B-47 has flown over the North Pole in a non-stop circular trip from Eilson Air Force Base, near Fairbanks, Alaska. By refueling in mid-air three times, a B-47 has remained aloft for 24 hours, during which time it flew some 12,000 miles in a special endurance test of the

(*Turn to page* 76, *please*)

From A SIMPLE SWITCH

To AN AUTOMATIC BRAIN

SYNCHRO-START CONTROLS
FIT EVERY ENGINE REQUIREMENT

The control panel pictured above is that used for FIRE PROTECTION at many large manufacturing plants — air fields — hospitals — theatres — department stores — office buildings and which is accepted by Insurance Companies as wholly dependable protection.

Engines controlled by SYNCHRO-START have opened many new fields providing huge savings for the users of engine power as the main source, or as stand-by in case of emergency.

For the past eighteen years, SYNCHRO-START CONTROLS have been constantly rendering dependable service and protecting lives and property all over the world — on the seas, in the air, on land and in the mines.

The duty and functions of SYNCHRO-START CONTROLS are:

1. To automatically START an engine at a predetermined TIME or a CONDITION when power is needed, no matter what the application may be.
2. To automatically STOP that engine when its power is no longer needed and to have it ready for the next POWER DEMAND.
3. To automatically PROTECT that engine, its accessories and the *equipment* it is driving, against any abnormal condition that may cause *damage* while it is running. Also to indicate the cause of any trouble should it occur.
4. To afford valuable SAVINGS by having a DEPENDABLE source of power always available.

If you are not familiar with the SAFETY and the ECONOMY provided by SYNCHRO-START CONTROLLED ENGINES, ask your engine manufacturer — engine dealer — engineering firm, architect, or write to us for free information and our nearest representative.

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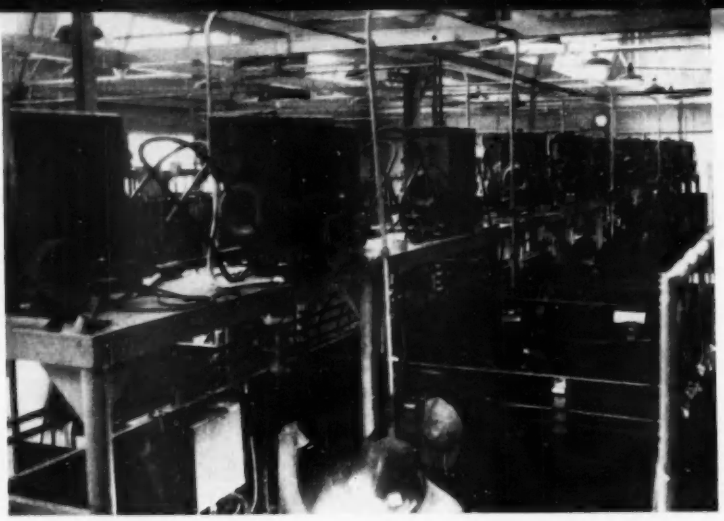
OVERSPEED GOVERNORS SOLENOIDS TIME ELEMENTS RELAYS SWITCHES SAFETY CONTROLS RECORDING CONTROLS PRE-SET AUTOMATIC OR MANUAL CONTROL SYSTEMS FOR INTERNAL COMBUSTION ENGINES

Advanced Tooling

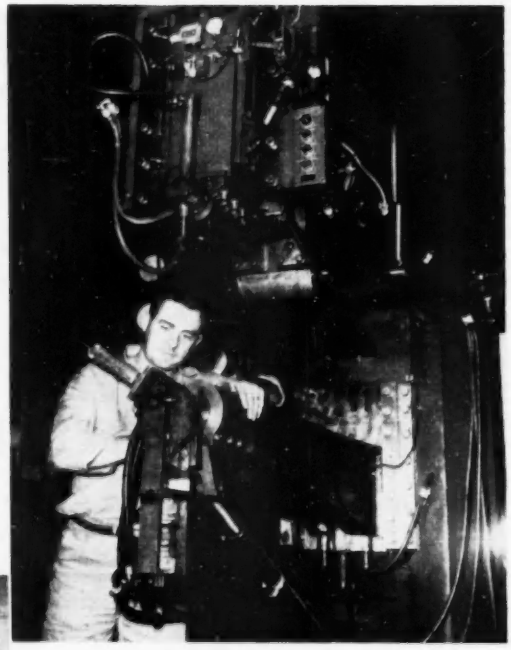


Looking down one row of heliarc welding booths in Ryan's new welding building which provides the ultimate in light, ventilation, space and modern welding facilities. Note overhead motor-generators, piping for argon gas and efficient lighting arrangements.

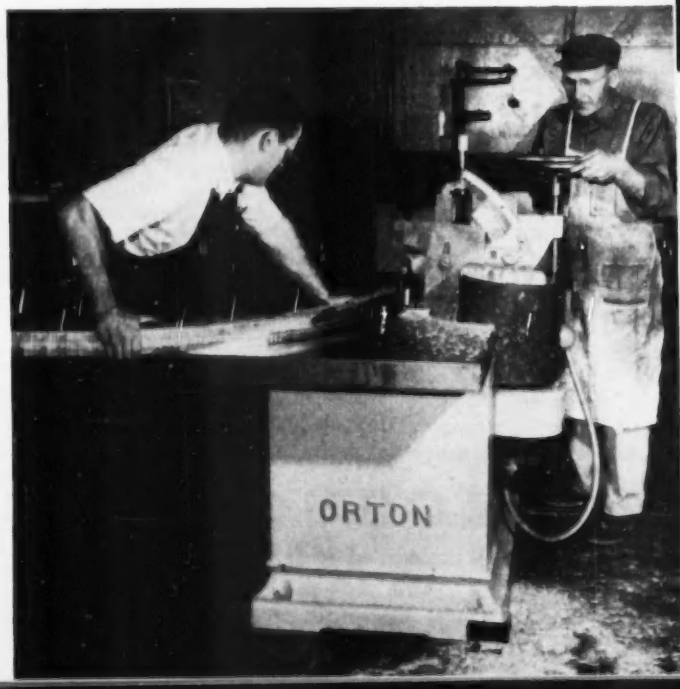
ILLUSTRATED here are some of the recent tooling advances at Ryan Aeronautical Co., San Diego, Calif. They are: a variable tilt shaper which saves many hours of hand work on cast aluminum form blocks; a Ryan-designed rotatable electrode; and a new arrangement of heliarc welding booths.

Designed and built by the Orton Machine Co. of San Francisco, the $6000 variable tilt shaper handles the machining, to varying angles, of the edges of cast aluminum form blocks used to fabricate bulkheads, frames, gussets, ribs, and many other structural parts for aircraft. Before this special machine became available, the form blocks had to be made by hand. First, the slab was cut with a band saw, using a steel template to outline the cut. Next, the template was attached to the form block which was then filed by

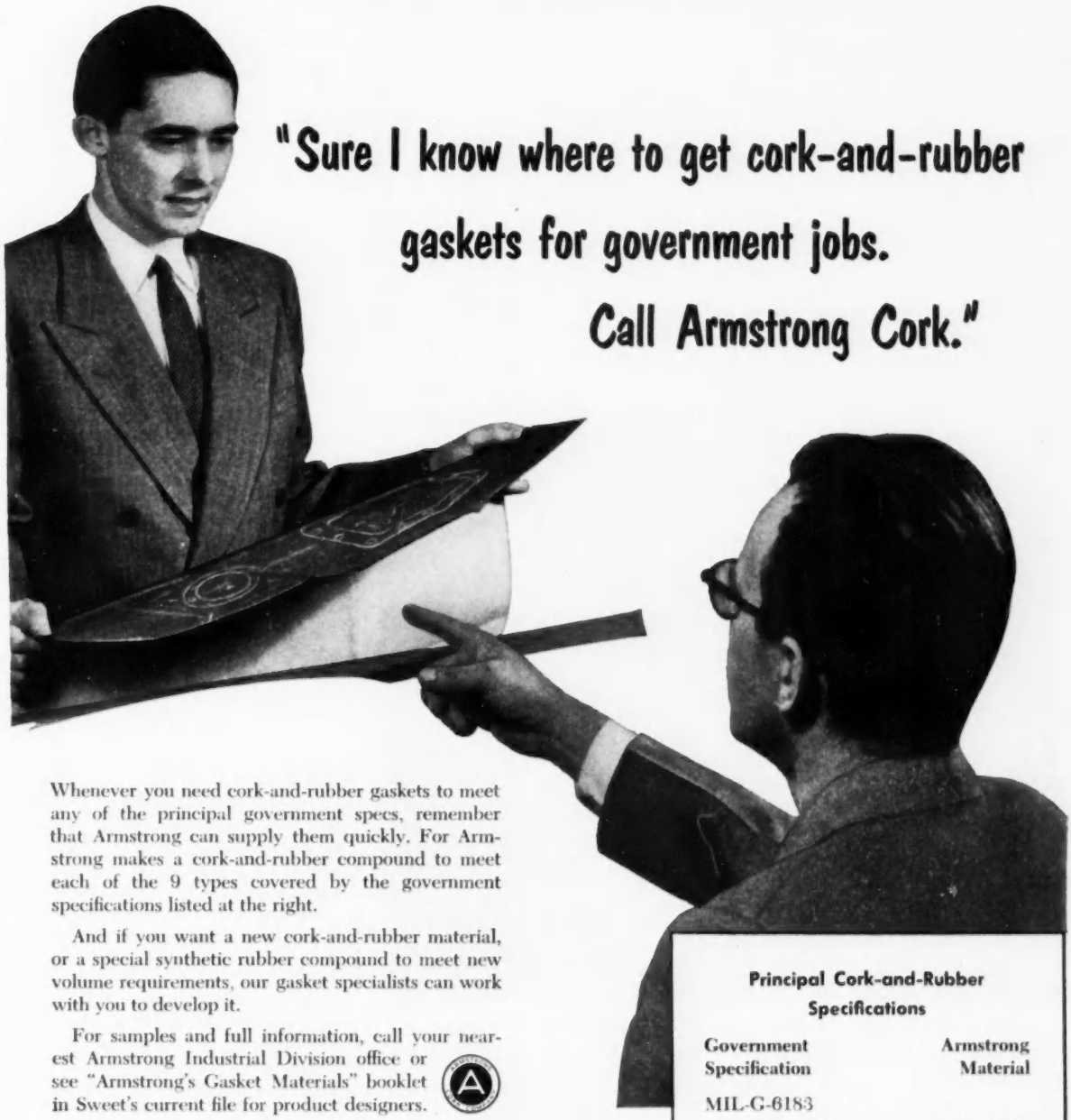
(*Turn to page* 118, *please*)



Ryan engineers have designed special hydraulic controls which rotate the lower electrodes of the spot welding machines so that large tank sections may be moved into the machines with greater ease. With a finger-tip switch, the operator rotates the electrode and obtains 12 in. of added clearance.



The variable tilt shaper has a cutter which is suspended slightly above the surface of a steel table by means of a circular mounting. The cutter head unit and five-hp electric motor are mounted on an outer quadrant which slides over an inner quadrant on bronze ways. The inner quadrant is mounted on the frame of the machine. By turning a control wheel, which actuates a worm gear and pinion, the outer quadrant can be rotated over the inner quadrant. No lock is required to maintain its position because of its substantial design.



"Sure I know where to get cork-and-rubber gaskets for government jobs. Call Armstrong Cork."

Whenever you need cork-and-rubber gaskets to meet any of the principal government specs, remember that Armstrong can supply them quickly. For Armstrong makes a cork-and-rubber compound to meet each of the 9 types covered by the government specifications listed at the right.

And if you want a new cork-and-rubber material, or a special synthetic rubber compound to meet new volume requirements, our gasket specialists can work with you to develop it.

For samples and full information, call your nearest Armstrong Industrial Division office or see "Armstrong's Gasket Materials" booklet in Sweet's current file for product designers.

Principal Cork-and-Rubber Specifications

Government Specification	Armstrong Material
MIL-G-6183	
Type I Soft	NC-709
Type I Medium	NC-710
Type I Firm	NC-711
Type II Soft	DC-167
Type II Medium	DC-100
Type II Firm	DC-113
MIL-T-6841	DK-153 or RK-304S
MIL-G-6747	DK-149
MIL-G-17539	RK-375

Get This Free Gasket Data Book →

The 24-page manual, "Armstrong's Gasket Materials," gives you information on current government specifications and tentative SAE-ASTM specifications. You'll also find helpful sections on the design and use of gaskets, covering subjects like *Designing Gaskets to Reduce Costs, Practical Tolerances for Resilient Gaskets, Designing for Efficient Sealing.*

For your free copy, write Armstrong Cork Company Industrial Division, 7106 Imperial Avenue, Lancaster, Pennsylvania.

Armstrong's Gasket Materials

AIRBRIEFS

(*Continued from page 72*)

machine. Air Force now has two complete combat wings of the B-47 in service and others are being formed as the B-47 is delivered at the rate of one each working day from the three (Boeing, Douglas, Lockheed) giant plants producing it.

NACA Probes Transonics

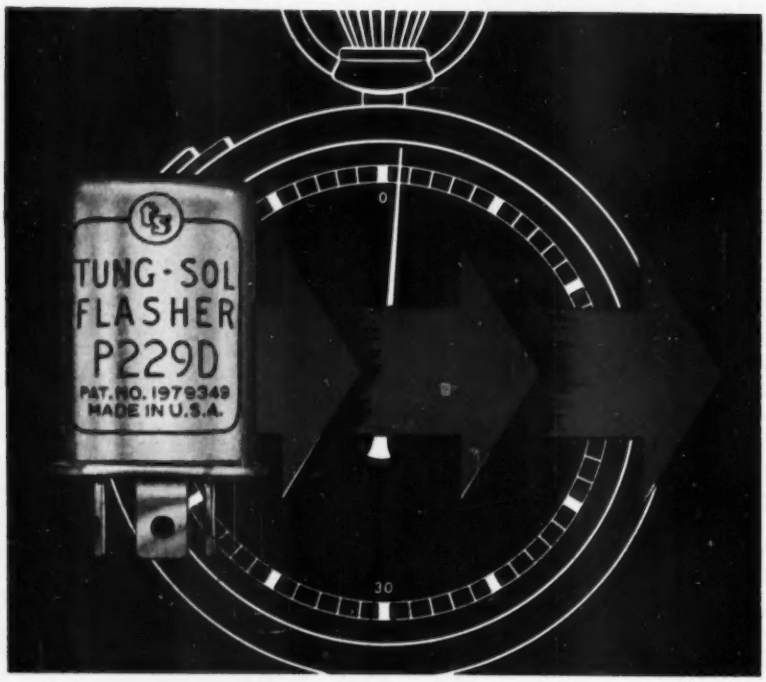
The National Advisory Committee for Aeronautics, the nation's scientific research agency, is rapidly narrowing the gap between subsonic and supersonic aerodynamic theory but the gap persists despite a multi-pronged attack on its intricacies. The aerodynamic and structural problems of aircraft flying at speeds of less than about 700 mph and at more than about 850 mph can be tacitly considered "solved" but the NACA has used calculating machines, wind tunnels, free-flight models and manned research aircraft to attack that 150-mph gap in knowledge. In this speed regime (which varies considerably with altitude and vehicle size and configuration) both subsonic and supersonic airflows are mixed, which defeats all mathematically approaches. This mixed-flow condition results in unpredictable stability changes, such new types of flutter as "chordwise," "skin or panel," and "bending-pitching." Aerodynamic heating, now fully recognized as the next major "barrier," not only presents problems of structural strength loss in flight but results in a lowering of the flutter frequency with mid-air destruction dangers. Nevertheless, NACA is energetically testing th effect of creep at elevated temperatures, the friction heating effects of speeds as high as Mach 20 (20 times the speed of sound) and temperature distributions in a wing structure with resulting buckling problems. NACA has produced a novel approach to the convertible aircraft design problem: a four-winged airplane in which the fuselage and engines are always horizontal but the camber of the wings moves through almost a full 90 deg to deflect the air straight down for vertical flight and, of course, straight back for horizontal flight.

Skill Eliminator

Despite the fact that the Wright brothers recognized the problem 50 years ago, the delicate balance between airplane speed and airplane attitude required for safe landing has persisted for 50 years and has made piloting an airplane a pure art rather than a science. Safe Flight Instrument Corp., which earlier developed the successful stall warning indicator, now has brought out a Landing Speed Indicator which does all the figuring required by the pilot's mind, hands and feet during a landing maneuver. The new instrument has but a simple needle which, when kept centered throughout the final approach, produces a perfect landing. The instrument automatically integrates such factors as the airplane weight, the weight distribution, the position of the flap or landing gear, the amount of power being developed, the airplane speed and its attitude into a single needle indication. A pilot merely keeps the needle centered, regardless of whether he is flying a glider or a multi-engine transport, and the landing is made perfectly.

Airline Fares Okay

The Civil Aeronautics Board has decided to abandon its full-scale in-



Within half a second, the TUNG-SOL Flasher is in operation; providing a blinking signal more quickly than any other type of flashing device.

Instant Warning!

Tung-Sol makes All-Glass Sealed Beam Lamps; Miniature Lamps; Signal Flashers, Picture Tubes, Radio, TV and Special Purpose Electron Tubes.

TUNG-SOL ELECTRIC INC.
Newark 4, N. J.

Sales Offices: Atlanta, Chicago, Culver City (Los Angeles), Dallas, Denver, Detroit, Newark, Philadelphia, Seattle.

NEW MUSKEGON "UNITIZED"

pre-assembled...install like a one-piece ring!

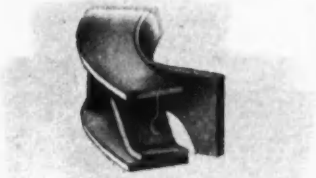
Dangle a new, patented Muskegon "UNITIZED" steel oil control piston ring from your fingertip and see a world of difference! For this multiple piece ring not only has superior features *but it handles like a one-piece ring!* That's right! This exclusive Muskegon ring is pre-assembled . . . and BONDED TOGETHER—holds fast until the engine is run.

This Muskegon "UNITIZED" piston ring eliminates assembly time and assures the *right* assembly. It can be inserted and compressed like a one-piece ring. It's fast and simple to install.

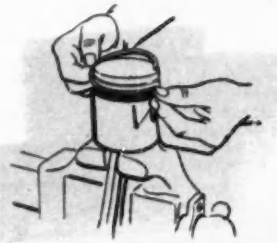
Here's more good news! The Muskegon "UNITIZED" ring is available in these two types: **CSR-200** *with fully chrome plated edges* for double to triple ring life; and the **CSR-100** *without chrome edges.* These rings will meet *all* your requirements and they are "Muskegon engineered" for dependable performance. Call or contact us now!

MUSKEGON PISTON RING CO., Muskegon, Mich.

EXCLUSIVE! PATENTED!



Muskegon CSR-200 "UNITIZED" ring consists of: spacer, two rails—with edges fully chrome plated assuring double to triple ring life and heavy duty expander.



HANDLE LIKE A ONE-PIECE RING!
Rails and spacer are correctly assembled . . . and bonded together making it as easy and convenient to handle as a one-piece ring whether on the production line or in the service shop.

BONDING AGENT DISAPPEARS DURING ENGINE RUN!
Muskegon bonds the pieces together with a special adhesive agent that dissolves in the hot engine oil during engine run. Pieces free entirely to give the outstanding, long performance for which all Muskegon rings are noted.

MUSKEGON Piston Rings

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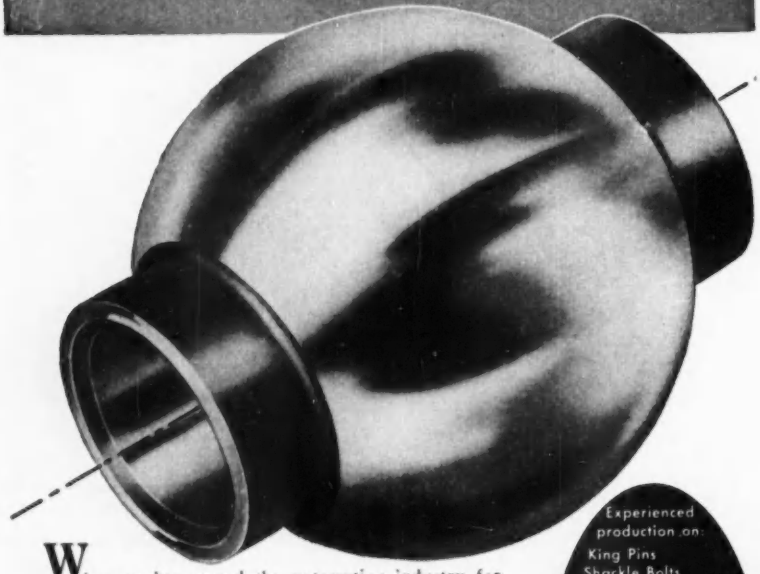
vestigation of airline fares and profits, a probe the industry has fought bitterly for the past six months because of its substantial cost in time, effort and money with uncertain benefits to either the Government or the airlines. Airline profits have increased progressively during the past three years and the Board had announced plans to investigate the entire airline financial picture, an action that would have required more than a full year of time, millions of words of testimony and millions of dollars in attorney's fees and other costs. Now the Board feels such an investigation is no longer warranted because previous airline losses and low profits combined with current profits produce a 10-year average that is not unreasonable, that current profits should automatically produce a growth in air coach service desired by the Board, that the "business cycle" should reduce future profits (already indicated in returns this year) and its own internal study should more clearly define the issues before launching an industry-wide probe. The Board has constantly investigated air mail and freight rates and Government payments to airlines are under continuing investigation but the projected probe was to have been passenger fares and income therefrom. Currently, mail pay amounts to only 5-20 per cent of individual airline income. Despite recent profit rates of 15-20 per cent on sales, airline profit rate since the Board was created in 1938 average only eight per cent, which the Board considers "fair and reasonable" return.

Specialized Production of
HARDENED & GROUND PARTS



When you've served the automotive industry for more than 40 years as we have done, you become quite adept at machining difficult pieces like the Beam Ball shown here.

Ball O.D. is ground to 3.375" ± .001; Bore, to 1.375" ± .001. Circular contour is absolutely concentric with bore center line. Scientifically controlled heat treating provides exceptional surface hardness and consistent strength throughout. The specified finish is Parco Lubrite, as used on many of our products.

This is a sample of the metallurgical engineering, precision grinding and uniform quality that can be readily applied to mass production of your turned, hardened and ground parts. Let us quote on your requirements. Write or wire today.

Experienced production on:
King Pins
Shackle Bolts
Shackle Pins
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Countershafts
Idler Shafts
Stub Axle Shafts
Steering Ball Bolts
Beam Balls and Bolts
5th Wheel Rocker Shafts
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... anything in the hardened and ground line of any analysis steel, up to 4" ...

Henry W. Brown
PRESIDENT

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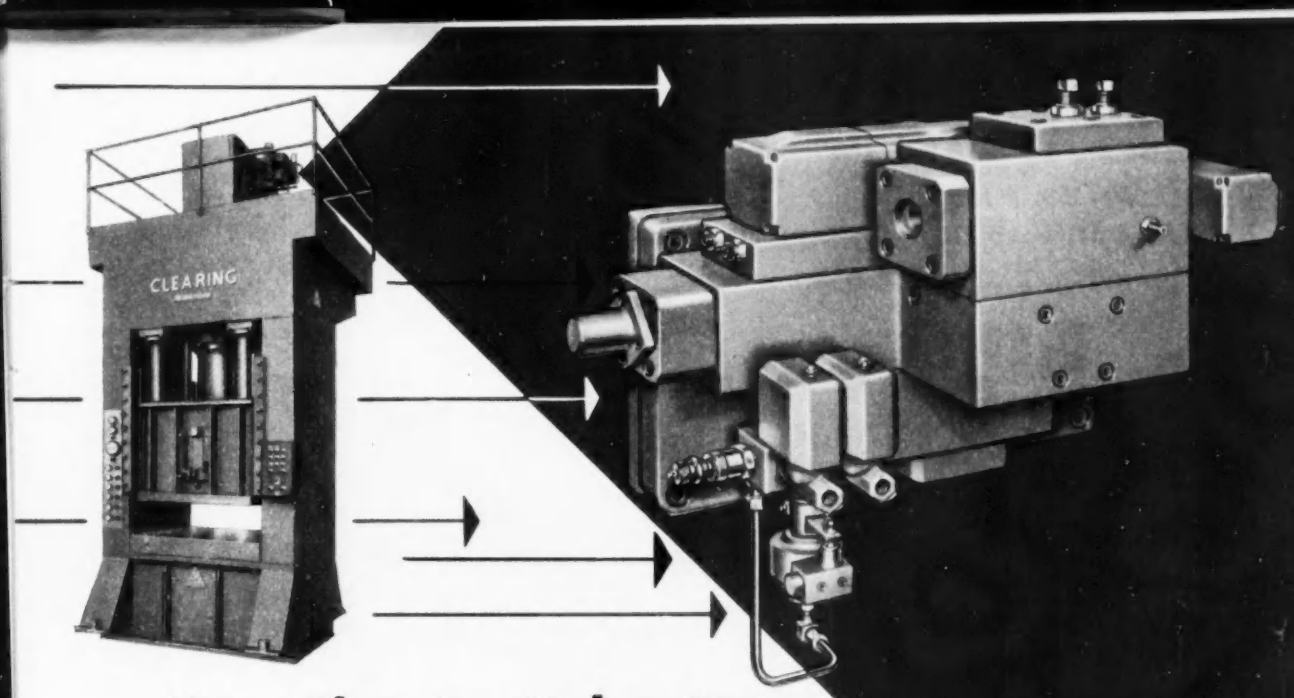
C. H. Elvin, 2457 Clarendon Rd., Cleveland • R. F. Spring, 4716 Balfour Rd., Detroit • R. C. Sanderson, 6500 N. Clark St., Chicago • Harry J. Winchester, 1704 Carlton, Fort Worth • Johns Wilson & Co., 1440 N. Spring St., Los Angeles, Calif. • John B. Hunt, 5811 S.E. Yamhill St., Portland, Ore.

BOOKS . . .

URANIUM, PLUTONIUM AND INDUSTRY: A SUMMARY OF THE U. S. ATOMIC ENERGY PROGRAM, *published by The American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y. Price, $1.50.* This booklet attempts to give a broad pattern of the atomic energy industry as it exists today. Specifically, it outlines the Atomic Energy Commission's production program, sketches the research and development network, discusses applications of atomic energy, and lists sources of information on the atomic energy field.

ASTM STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS, *published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, $5.75, paper covers; $6.40, cloth cover.* This 1952 compilation of ASTM Standards on Petroleum Products and Lubricants (with related information) brings together in compact form, most of the ASTM standards, test methods, and specifications widely used in this field. (The tests for knock rating of engine fuels and certain standards for measuring and sampling petroleum are issued in special manuals and not included in this compilation). Prepared by ASTM Committee D-2 on Petroleum Products and Lubricants, this 831-page edition gives in their latest form 135 ASTM standards, including 119 test methods; 10 specifications; one classification; three lists of definitions relating respectively to petroleum, specific gravity, and rheological properties of matter; two recommended practices; one for the purchase of uninhibited mineral oil for use in transformers and in oil circuit breakers, and one for designating significant places in specified limiting values; and other material. There are groups of widely used standards in this compilation covering the following broad classifications of petroleum products: crude petroleum; butadiene; motor and aviation fuels; petroleum solvents and naphthas; diesel fuels; distillate burner fuels; kerosene and illuminating oils; lubricating oils; turbine oils; electrical insulating oils; plant spray oils and petroleum sulfonates; lubricating greases; and petrolatums and paraffin waxes. Included also are standard specifications for ASTM thermometers, and test method standardization of etched-stem liquid-in-glass thermometers. A high percentage of the material included in the earlier edition has been revised and 10 of the methods are new. The specifications and tests that have been revised contain a brief explanation in footnote form of changes incorporated since the previous edition.



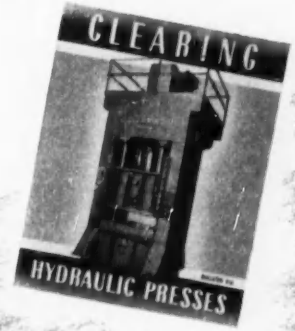
How Clearing Valve Unit Cuts Hydraulic Press Maintenance

The Clearing Hydraulic valve unit concentrates necessary valving into a solid compact unit, which is firmly anchored to the oil reservoir. Unit construction does away with piping ordinarily required to connect separate valves to the reservoir. In this way the effect of hydraulic pulsation in the system is reduced and maintenance problems due to leaks or failures from this source are eliminated.

Valve bodies are cut from solid steel forged blocks and all chambers and ports are bored from solid—there can be no harmful distortion. Corrosion resistant, chrome plated valve spools are free to move without the possibility of binding.

This heavy duty hydraulic operating unit was designed by Clearing engineers to give you years of profitable, trouble-free press operation. Another important reason why you get more out of a Clearing hydraulic press.

Catalog on Clearing Hydraulic presses will be sent on request. Write today.



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THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION, 6498 West 65th St., Chicago 38, Illinois • HAMILTON DIVISION, Hamilton, Ohio

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CLEAN-UP TIME BY AS MUCH AS 80%

WITH F.O.S. MASKING TAPE

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That's what they're saying about the new F.O.S. Masking Tapes with "anchored bonding," the strongest bond yet developed between adhesive and backing.

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Unroll six inches of the tape you are using. Unroll a similar length of a comparable F.O.S. Tape. Adhere the two tapes, adhesive to adhesive. Now strip them apart. The superior bonded anchorage of the F.O.S. Tape "picks off" the adhesive of the competitive tape. Try this test—pick the winner.

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For production, assembly, packaging or shipping, you can save time and money with F.O.S. Industrial Tape. Ask an F.O.S. Tape Analyst to help you with special tape problems.

Your request for samples, prices, catalogues answered promptly, without obligation. Write factory today.

F.O.S. INDUSTRIAL TAPE DIVISION
THE SEAMLESS RUBBER COMPANY
NEW HAVEN 3, CONN.

The Business Pulse

(*Continued from page 70*)

New Construction

Other industries also continue to give an excellent account of themselves. Expenditure for new construction has generally been running five to six per cent above that a year ago, while the letting of new contracts for heavy construction projects—indicative of future construction expenditures—has shown an even more favorable relationship. For the first 21 weeks of 1953, the dollar value of such contracts was about 20 per cent higher than in the like period of 1952, according to *Engineering News-Record*. The recent upward adjustment in interest rates is looked upon as a stimulant by builders, who generally think that it will increase the availability of mortgage money without seriously discouraging prospective home purchasers.

Electric power production continues to hold well above that a year ago. Freight carloadings have recently shown an improvement of greater than seasonal magnitude. Production of men's clothing has been considerably greater thus far this year than in 1952, and excellent spring sales in New York's Worth Street textile market suggest that cotton-mill operations will be relatively high at least through the third quarter of this year.

During the first quarter of the year, consumption in general kept pretty well in line with high output rates, and accumulation of inventories was markedly slowed. Incomplete data for April, however, suggest that sales volume in retail outlets may have suffered a moderate decline. This has brought expressions of concern from some observers, many of whom are perhaps inclined to be hypersensitive at present because of the prevalent talk of a possible downturn later in the year. Department store sales failed to show the expected seasonal gain in April, and in addition retailers of household goods reported a weakening in demand for some lines.

Effect of Weather on Sales

The apparent decline in sales volume during April may, however, be a poor indication of underlying tendencies, inasmuch as the month was featured by exceptionally unfavorable weather in many sections of the country, which may well have been a reason for less than satisfactory turn-

AIRBORNE
is proud that these Companies are among its many customers

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NORTH AMERICAN AVIATION, INC.
REPUBLIC AVIATION

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Production quantities of our actuators have been delivered to these well-known companies during the past year. To such leaders we owe our continued growth.

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ACCESSORIES CORPORATION
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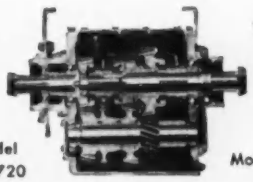
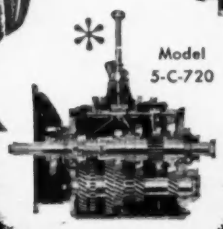
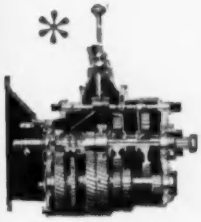


Model 3-A-65

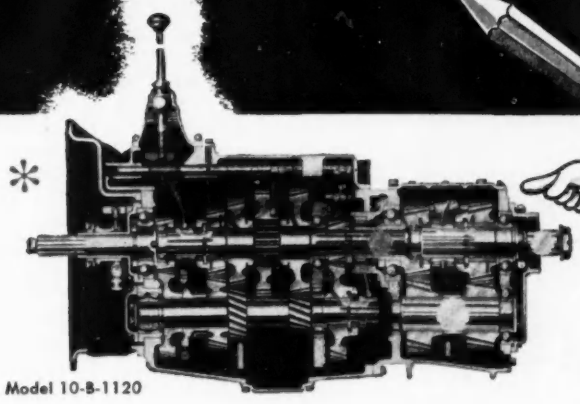
Model 5-C-720



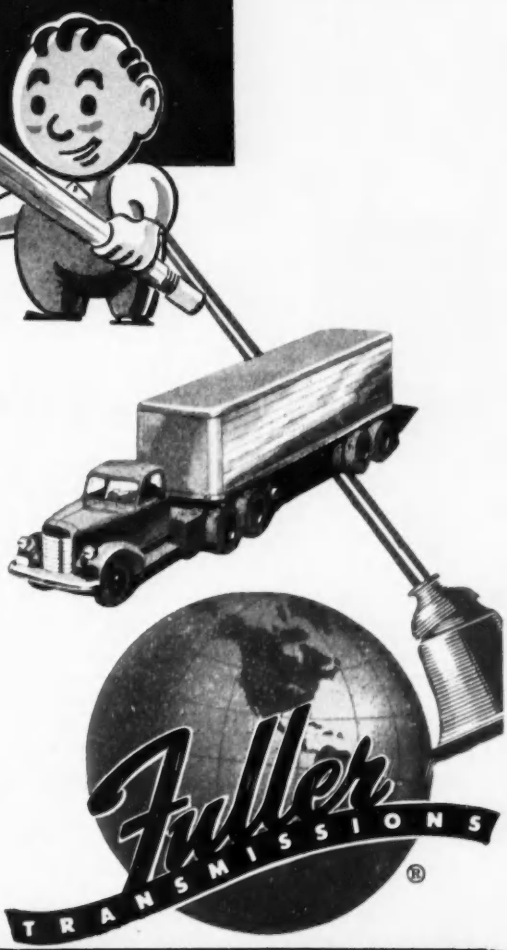
You write the Specifications!



Model 5-A-620



Model 10-B-1120



Before buying a new truck, you carefully consider all factors related to the job you'll want your truck to do . . . every road and load condition . . . everything that affects your particular operation.

You specify the "make" of truck . . . the type . . . the power plant . . .

✻ Specify the transmission, too!

Among the more than 110 Fuller Transmission models for every heavy-duty job—there is a "proved in service" unit to fit *your* job . . . designed to operate quietly and dependably . . . profitably . . . and built to stand up under the most grueling conditions, on or off the highway.

Write for Condensed Specification Folder.

Fuller TRANSMISSIONS ®

FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

The Business Pulse

(*Continued from page 80*)

over in such lines as spring and summer clothing and used cars. Official Weather Bureau data show that rainfall was excessive throughout much of the Northeast and Northwest during April—170 per cent of normal, for example, in New York City—while at the same time other regions suffered from heavy tornado damage and bad dust storms. Incomplete data for the early part of May, when weather conditions generally became more favorable, indicate a better showing in retail establishments.

Throughout the economy generally, business inventories still seem to be in line with sales. At the manufacturing level, for example, the relation between sales and inventories, and also between unfilled orders and inventories, was about as good at the end of March as it had been a year earlier, and in some cases slightly better. Data through the first quarter show that the inflow of new orders to manufacturing establishments was roughly equal to sales, so that the favorable relationship which has existed for some time between unfilled orders and sales in both durable-goods and nondurable goods industries was maintained.

Some of the uncertainty which appeared with the launching of the Soviet "peace offensive" seems to have lifted, and commodity prices have regained part of the losses suffered earlier. No very pronounced tendency one way or the other has, however, been in evidence recently, markets reflecting a "wait-and-see" attitude. The expectation continues that a general advance will be effected in base prices of steel products as soon as the question of steel wages is settled, inasmuch as steel consumers have reacted calmly to the increases already made in "extras." The feeling is that the amount of increase in steel prices will be conditioned by the wage settlement.

Spending and Taxes

Despite the President's lucid statement on spending and taxes, the fiscal outlook remains cloudy because of the outspoken opposition to parts of his program in certain Congressional quarters. While the outcome of the developing debate is in doubt, it seems almost certain that military spending will rise further in coming months and that the Federal Government will incur a rather substantial deficit for fiscal 1954. A deficit of $5.6 billion is anticipated even if Congress does not respond to the strong pressures for tax relief. Since those interested in tax cuts and those interested in restoring parts of the proposed reductions in military spending have thus far been the most vocal, there is a strong possibility that, if changes are effected in Mr. Eisenhower's program, they will be in the direction of a greater rather than a smaller deficit. The prospect that Treasury operations will continue to have an inflationary bias for some time to come, when considered together with the high rate of planned business investment and the generally satisfactory pattern in consumer expenditures, suggests that some of the more pessimistic forecasts of a serious business downturn in the second half of this year may need revision.

AIRCRAFT
GENERATOR
TESTER
SUN model AGT-2
Especially designed to comply with United States Air Force Specification MIL-S-7223, this unit will test 28-volt aircraft and similar DC generators with output capacities up to 600 Amperes and speed ranges from 2000 to 11,600 RPM.

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. . . for special-order, built-to-specification scientific test equipment . . . SUN Electric Corporation is the world's largest manufacturer of Automotive and Aircraft Electrical and Electronic Testing Equipment, supplying approximately 70% of the testing equipment of this type to U.S. automotive dealers. That is why the leaders in every branch of the industry look to SUN as the logical choice to design and build special scientific equipment to meet their particular testing needs. The unit pictured is an example of a test problem solved with such specially designed equipment. Other SUN special-order units are in use in car, truck and tractor factories, aircraft and ordnance plants and in the factories of engine and component parts manufacturers everywhere. In production testing, spot checking and in quality control of material these special SUN Testers offer a high speed simplified operation that will save thousands of dollars and many production headaches.

DON'T GUESS-TEST! SUN Engineers will be glad to discuss the design of special test equipment that can solve *your* testing problems too! Write TODAY for the SUN SPECIAL TEST EQUIPMENT Catalog.

SUN Equipment is available in 6-12-24 volt units.

Sun DIAGNOSIS SUN EQUIPMENT

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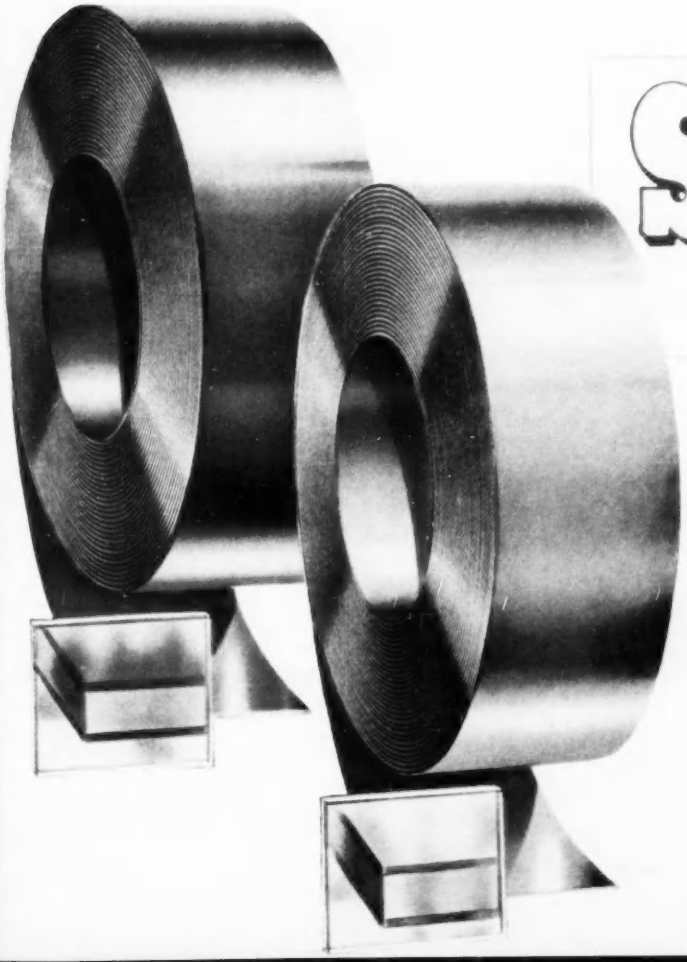
AUTOMOTIVE INDUSTRIES
are always well informed

Help Yourself to Profit

WHILE YOU HELP SAVE

COPPER AND BRASS

FOR DEFENSE



SuVeneer®

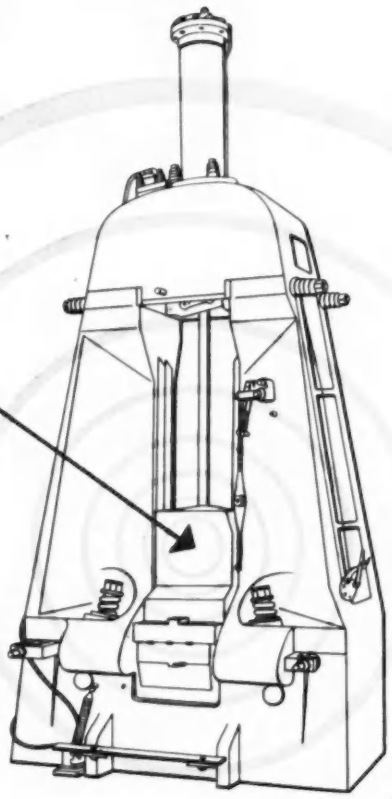
CLAD METALS

There's a two-way benefit in every coil of **SuVeneer** Clad Metals: profitable economy for you, and conservation of critical materials for defense.

The *solid* copper or brass on steel represents a saving of 70% to 80% over equivalent gauges of the single non-ferrous metals, and brings the inner strength of steel to your copper or brass product applications. The metals are bonded inseparably—you use your regular fabricating methods with this time-proved product. • Let us cooperate with you.

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

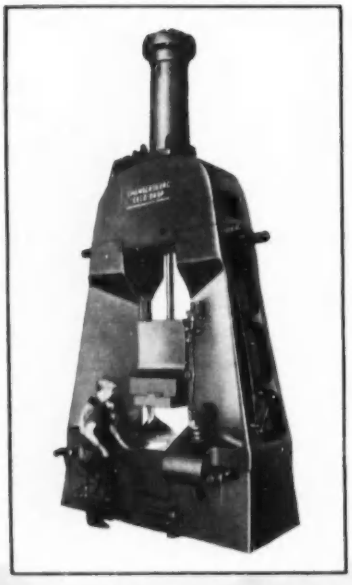
CENTER OF GRAVITY AT POINT OF IMPACT



• • • The center of gravity of the CECO-DROP concentrates the forces toward the base and gives a more effective blow.

• • • The center of gravity of the whole hammer approximates the center of gravity of the ram at the point of impact minimizing the fight between the ram and the other parts of the hammer.

• • • The resultant maintenance of die alignment assures fewer rejects and higher production in comparison with other types of forging hammer. This is an outstanding difference between CECO-DROPS and other hammers.



CECO-DROP PISTON LIFT GRAVITY DROP HAMMERS

are the result of more than a half century of experience in the design and manufacture of hammers. They cost less to operate. There are no board changes, no friction adjustments, and lubrication is automatic. Treadling the Ceco-Drop is easy and not fatiguing, and die alignment is held. The unique stroke adjustment and short stroke control afford a wide range of operation. Ask for our Bulletin 11-L-O.

CHAMBERSBURG ENGINEERING CO. • CHAMBERSBURG, PA.

CHAMBERSBURG

THE HAMMER BUILDERS

Builders of THE IMPACTER

"FORGING IN MID-AIR"

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 64)

Manifold Breather

Recently announced is a small unit which screws into the intake manifold of automobiles to facilitate quick starting of hot engines. The manufacturer claims that this manifold breather allows waste gases trapped by heat in the intake manifold to escape immediately into the outer air. Thus, it is claimed, new live fuel will ignite immediately.

The unit is constructed of brass, aluminum, and stainless steel. It measures 1½ in. from top to bottom, and the cooling head is one in. in diameter. The breather reportedly can be easily installed anywhere on the intake manifold. *Hellings Co.*

Circle P-10 on page 65 for more data

Truck Tire

Recently added to a tire line is a heavy-duty truck tire. A cured shape is said to control tread cracking and separation during the first few hundred miles when carcass cords are being equalized in tension and stress and are becoming set.

It is claimed that the cushion rubber is stronger, while a new tread design increases traction and reduces wear. *Gulf Oil Corp.*

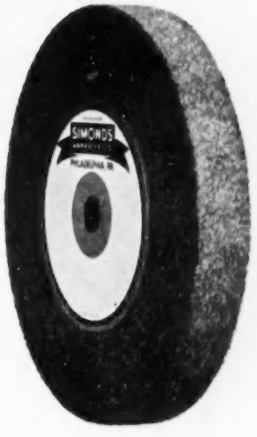
Circle P-11 on page 65 for more data
(*Turn to page* 126, *please*)

Control gives top results in grinding too!

SIMONDS ABRASIVE CO.

Grinding Wheels

Take Simonds Wheels, for instance! They're quality-controlled for top performance. And this is *complete* quality control. It begins with the raw materials used in the wheels. It continues throughout the screening, mixing, pressing, firing and finishing operations. It governs the minute, but essential variations in the relationship between bonds and cutting particles. It is backed by research and maintained by modern facilities to give you consistently superior results on roughing, finishing, cutting-off, polishing and sharpening. Free data book gives details on complete line. Write for it, and name of your Simonds distributor.



SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON

DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to March 4, 1953, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which were published in the April 15 issue, page 136, of AUTOMOTIVE INDUSTRIES, the following additional certificates were announced by the Defense Production Administration, March 4, 1953, to May 14, 1953.

Included in this latest tabulation, 16,817 new or expanded defense facilities of all types have been authorized for rapid tax write-off, the total amount eligible for amortization being $26,346,770,000. These figures are exclusive of cases that are up for later review but included in this list —in these cases no dollar amount is listed. The figure appearing in parentheses is the percentage authorized for actual fast tax write-offs.

Engineered by
BORG & BECK®
means . . . CLUTCHES built to the exacting standards which have made the name BORG & BECK famous for 36 years!
YOU CAN DEPEND ON
BORG & BECK®
CLUTCHES... FOR THAT VITAL SPOT WHERE POWER TAKES HOLD OF THE LOAD
Reg. U.S. Pat. Off.
BORG & BECK CLUTCH
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BW
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CHICAGO 38, ILLINOIS

—A—

American Fixture & Manufacturing Co., St. Louis, Mo.
Ordnance—$400,110 (60)

Anchor Slide Fastener Corporation, Westbury, L. I., N. Y.
Aircraft parts—$110,820 (70)

Automatic Steel Products, Inc., Canton, Ohio
Ordnance parts—$5,000 (70)

Aviation Engineering Corporation, Woodside, N. Y.
Aircraft parts—$21,834 (60)

—B—

Barridon Oil Burner Corporation, Hartford, Conn.
Aircraft parts—$11,384 (70)

Bell Aircraft Corporation, Wheatfield, N. Y.
Aircraft and aircraft parts—$21,990 (65)

Bell Aircraft Corporation, Fort Worth, Texas
Military aircraft—$51,016 (65)

Bendix Aviation Corporation, Teterboro, N. J.
Aircraft instruments and accessories—$94,393 (60)

Bendix Aviation Corporation, Sidney, N. Y.
Aircraft components—$15,301 (55)

Bendix Aviation Corporation, South Montrose, Pa.
Aircraft parts—$139,670 (65)

J. A. Bozung Company, Los Angeles, Calif.
Aircraft parts—$63,099 (70)

—C—

Casco Products Corporation, Bridgeport, Conn.
Ordnance—$105,000 (40)

Consolidated Vultee Aircraft Corp., San Diego, Calif.
Airplane and parts—$887,461 (65)

—D—

Dawco Manufacturing Co., Inc., Wichita, Kansas
Aircraft parts—$18,526 (70)

Detroit Engineering & Machine Co., Detroit, Michigan
Ordnance—$158,100 (55)

Douglas Aircraft Co., Inc., Santa Monica, Calif.
Aircraft parts—$195,437 (65)

Draper Motors Corporation, Centerline, Michigan
Ordnance—$42,691 (70)

—E—

Lee Elliott Associates, Limited, Texarkana, Texas
Ordnance—$77,000 (70)

(*Turn to page 88, please*)

Sleeve bearings in a wide range of designs and sizes; cast bronze bushings; rolled split-type bushings; bimetal rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars.

FEDERAL Mogul

We are Specialists in the Design and Production of

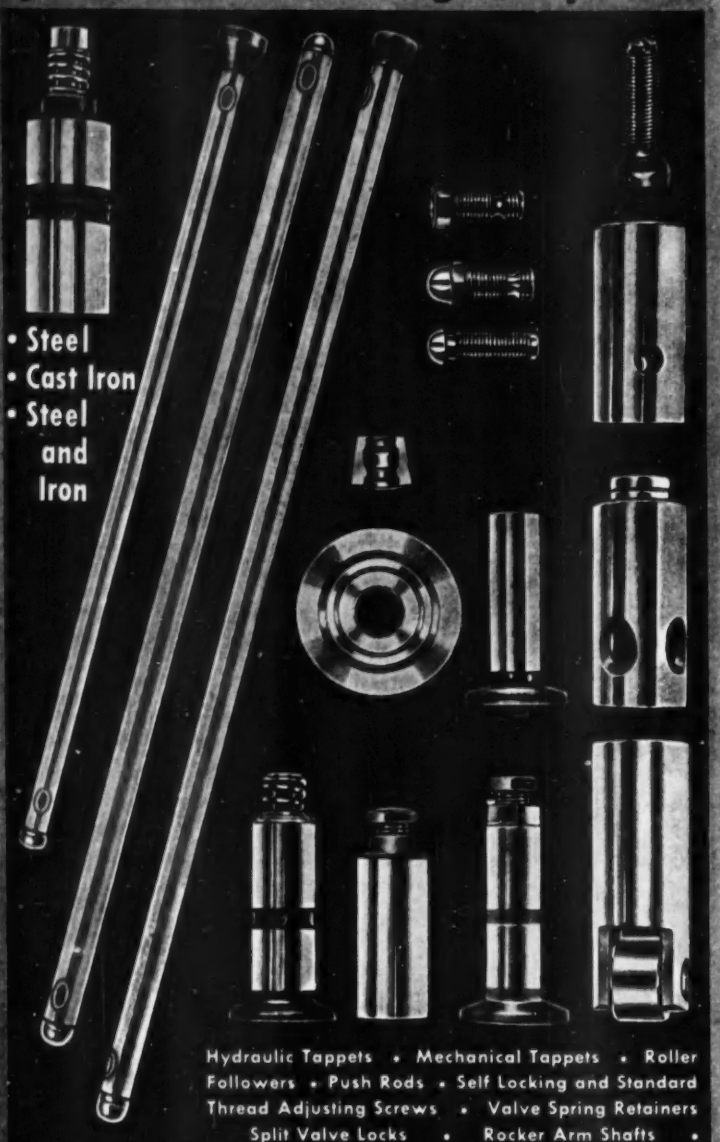
BIG BEARINGS

For a dependable source of your *big* bearing requirements, use our specialized facilities—conveniently located in Detroit. Our long experience producing a wide variety of sizes and types of sleeve bearings qualifies us especially well to supply your needs for 8″ to 27″ O.D. bearings. Bronze, cast iron or steel backs, copper-lead, babbitt or leaded bronze linings. Plain or flanged, half or full-round. All-bronze piston pin bushings. For big bearings, accurate in every *small* detail, write, phone or wire.

FEDERAL-MOGUL CORPORATION
11037 Shoemaker Avenue
DETROIT 13, MICHIGAN
Since 1899

FEDERAL-MOGUL

"CHICAGO"
precision valve gear parts



Hydraulic Tappets • Mechanical Tappets • Roller Followers • Push Rods • Self Locking and Standard Thread Adjusting Screws • Valve Spring Retainers Split Valve Locks • Rocker Arm Shafts •

Connecting Rod Bolts.....Hydraulic Cylinder Pistons
Cylinder Head Studs.....Cylinder Head Cap Screws
Main Bearing Studs.....Main Bearing Cap Screws
Flywheel to Crankshaft Screws.....Diesel Energy Cells
Wheel Bolts and Studs.....Differential Carrier Screws
Oil Pump to Distributor Shafts.....Remote Control Levers
Automatic Transmission Valves.....Water Pump Shafts

Special Screw Machine Parts ⅛" to 5" Diameter • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products

The CHICAGO SCREW COMPANY
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

(*Continued from page* 86)

—F—

Fairchild Engine & Airplane Corp., Hagerstown, Md.
Aircraft parts—$20,000 (40)
Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.
Aircraft parts—$5,678 (65)

—H—

Hartwell Aviation Supply Co., Los Angeles, Calif.
Aircraft parts—$33,304 (70)
Hollev Carburetor Company, Detroit, Michigan
Components for military end items —$9,245 (65)
Hydraulic Fittings Corporation, Marysville, Michigan
Aircraft parts—$50,596 (60)

—I—

Industrial Tool & Machine Co., Inc., Smithfield, R. I.
Aircraft parts—$8,500 (70)
Interstate Engineering, El Segundo, Calif.
Aircraft parts—$9,819 (65)

—K—

Kold-Hold Manufacturing Company, Lansing, Michigan
Ordnance—$115,407 (70)
Kollett Aircraft Corporation, Camden, N. J.
Aircraft parts—$41,449 (70)

—L—

Lockheed Aircraft Corp., Burbank, Calif.
Aircraft parts—$84,713 (60)
Aircraft and parts—$54,352 (60)
Lockheed Aircraft Service, Inc., Burbank, Calif.
Services of military aircraft—$29,-202 (65)
Lonergan Manufacturing Company, Albion, Michigan
Ordnance—$[illegible]5,000 (65)
Ordnance—$18,590 (65)
Luscombe Airplane Corporation, Garland, Texas
Aircraft and parts—$109,442 (60)

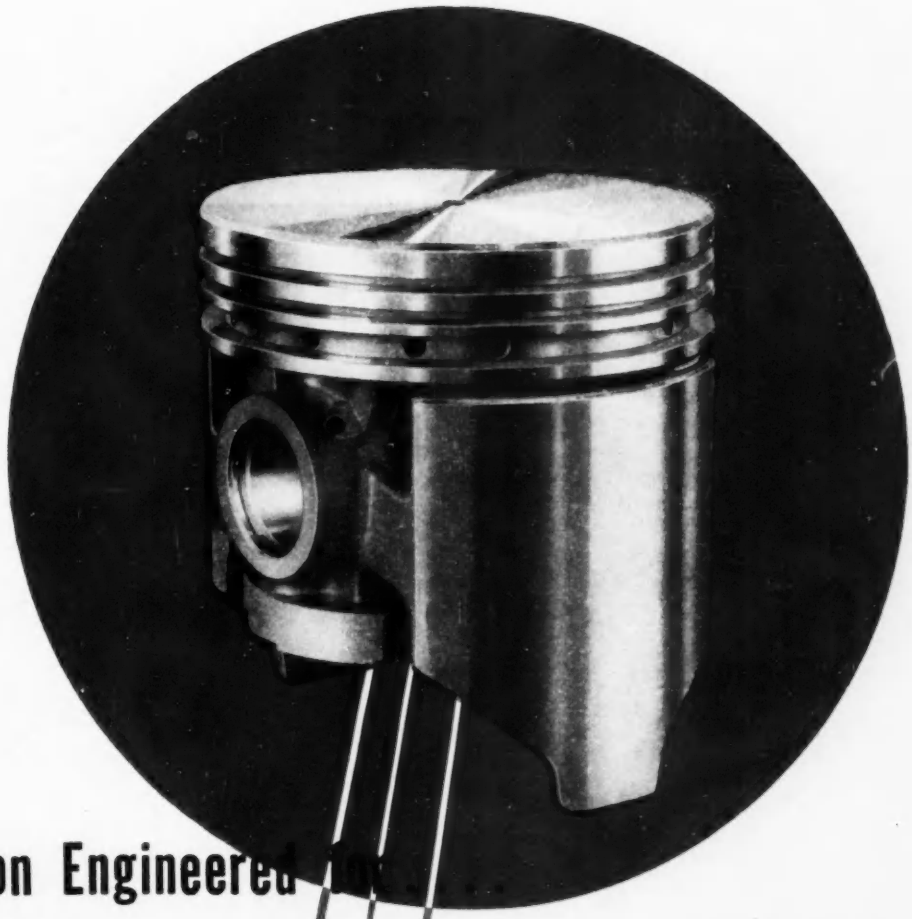
—M—

Glenn L. Martin Company, Middle River, Baltimore, Md.
Aircraft and parts—$83,209 (50)
Martin-Parry Corporation, Toledo, Ohio
Ordnance—$11,000 (65)
Mitchell Camera Corporation, Glendale, Calif.
Aircraft parts—$12,500 (70)

—O—

Oliver Corporation, South Bend, Ind.
Ordnance—$9,029 (65)

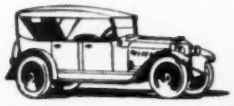
(*Turn to page* 90, *please*)



Precision Engineered for . . .

SMOOTH FLOWING POWER • HIGH OPERATING EFFICIENCY • MAXIMUM STRENGTH

PERMITE PISTONS



Over 30 Years
of Service to the
Automotive Industry
1921 to 1953

PERMITE

YEAR after year in leading makes of cars, trucks and buses, Permite Pistons prove their quality and stamina. Permite design and production engineers gladly work with automotive manufacturers on problems concerning their requirements for pistons, valves and other engine parts.

ALUMINUM INDUSTRIES, Inc. . . . Cincinnati 25, Ohio

Detroit: 809 New Center Building
New York: 9 Rockefeller Plaza
Chicago: 64 E. Jackson Boulevard

ALUMINUM PERMANENT MOLD AND SAND CASTINGS . . . HARDENED, GROUND AND FORGED STEEL PARTS

(*Continued from page 88*)

— P —

Packard Manufacturing Corporation, Indianapolis, Indiana
Ordnance—$5,477 (70)

Penn-Michigan Manufacturing Corp., Detroit, Michigan
Aircraft parts—$5,550 (70)

Phaostron Co., South Pasadena, Calif.
Aircraft parts—$36,725 (45)

— R —

Roberts-Gordon Appliance Corporation, Buffalo, N. Y.
Ordnance parts—$16,768 (70)

— S —

Safe Flight Instrument Corporation, White Plains, N. Y.
Scientific and technical equipment for defense—$4,576 (70)

Slanker Brothers, Dayton, Ohio
Aircraft and ordnance parts—$67,850 (45)

A. O. Smith Corp., Los Angeles, Calif.
Aircraft parts—$173,268 (65)

Solar Aircraft Company, Des Moines, Iowa
Aircraft components — $1,700,000 (40)

Solar Aircraft Company, San Diego, Calif.
Aircraft parts—$61,650 (40)

Sparks-Withington Company, Jackson, Michigan
Electronic equipment—$8,859 (65)

Stanley Aviation Corporation, Denver, Colorado
Aircraft parts—$440,000 (45)

H. A. Sward Company, Inc., Inwood, L. I., N. Y.
Ordnance—$75,000 (45)

— T —

T. & T. Manufacturing Company, Providence, R. I.
Ordnance parts—$16,522 (70)

Trifari, Krussman and Fishel, Inc., Providence, R. I.
Ordnance—$35,413 (70)

Turbo Industries, Inc., Glastonbury, Conn.
Aircraft parts—$6,041 (70)

— U —

United Aircraft Products, Inc., Dayton, Ohio
Aircraft parts—$51,173 (70)

— V —

Vahl Engineering Company, Brooklyn, N. Y.
Aircraft parts—$23,504 (70)

Vendorlator Manufacturing Co., Fresno, Calif.
Aircraft parts—$144,338 (65)

— W —

Wee-Ola Company, Ferndale, Mich.
Aircraft parts—$25,000 (45)

Western Control Corporation, Wichita, Kansas
Aircraft parts—$70,000 (40)

Western Electric Company, Inc., Greensboro, N. C.
Aircraft parts—$41,672 (65)

Western Electric Company, Inc., Winston-Salem, N. C.
Electronic equipment—$134,388 (65)

Westinghouse Electric Corporation, Harmerville, Allegheny County, Pa.
Special pumps for military end use —$1,167,500 (65)

— Z —

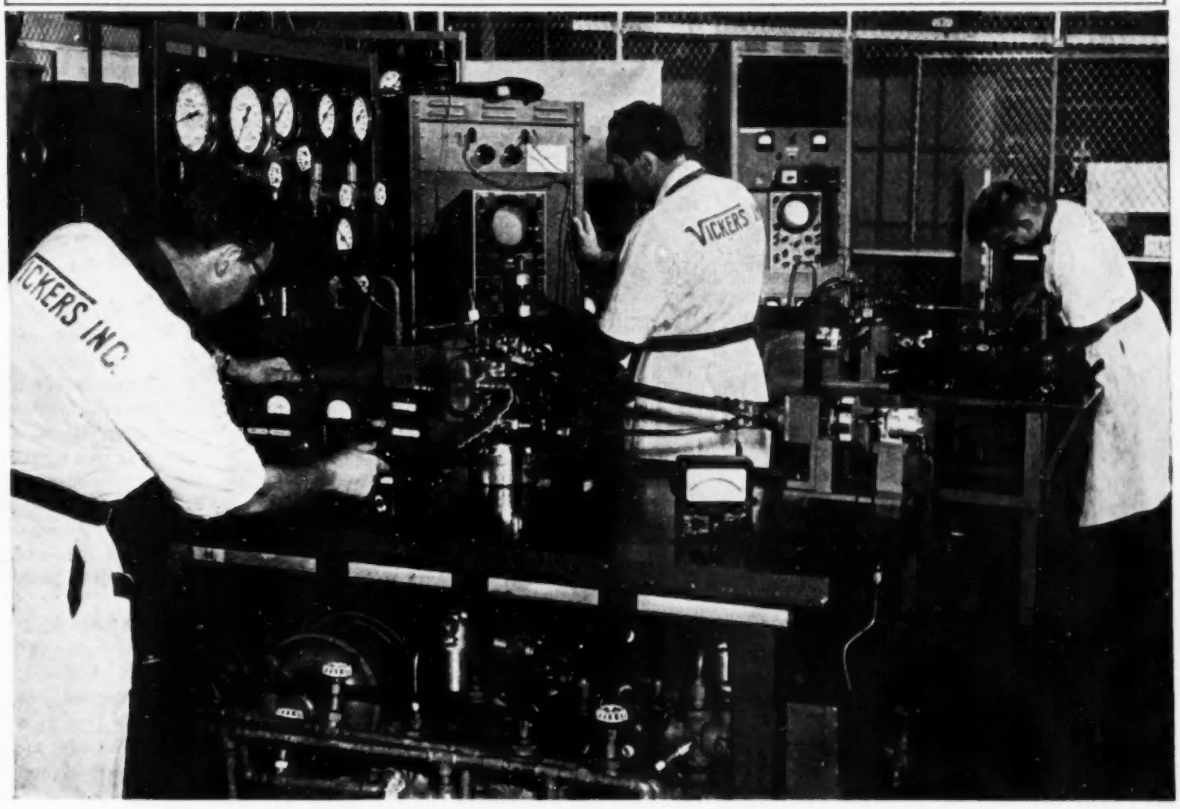
Zarkin Machine Company, Inc., Long Island City, N. Y.
Aircraft parts—$4,100 (70)
Aircraft parts—$19,000 (70)

AUTOMOTIVE INDUSTRIES

Keeps You Informed

ONE OF A SERIES

You Get Many Benefits by Specifying VICKERS Hydraulics



Research | that means improved oil hydraulic equipment

The list of pioneering developments in hydraulics contributed by Vickers research is long and impressive. Among the most important are:

Hydrostatic Relief Valve • Commercial Power Steering • Balanced Vane Type Pump • Flow Control Compensator • Axial Piston Pump and Motor

These are fundamental developments that have been of vital importance in the progress of hydraulics. They are representative of a large line of equipment that, with Vickers experienced application, assures you the best in any type of hydraulic operation. Vickers, with unmatched laboratory and basic research facilities, continues to lead the way in the oil hydraulics industry.

VICKERS Incorporated
DIVISION OF THE SPERRY CORPORATION
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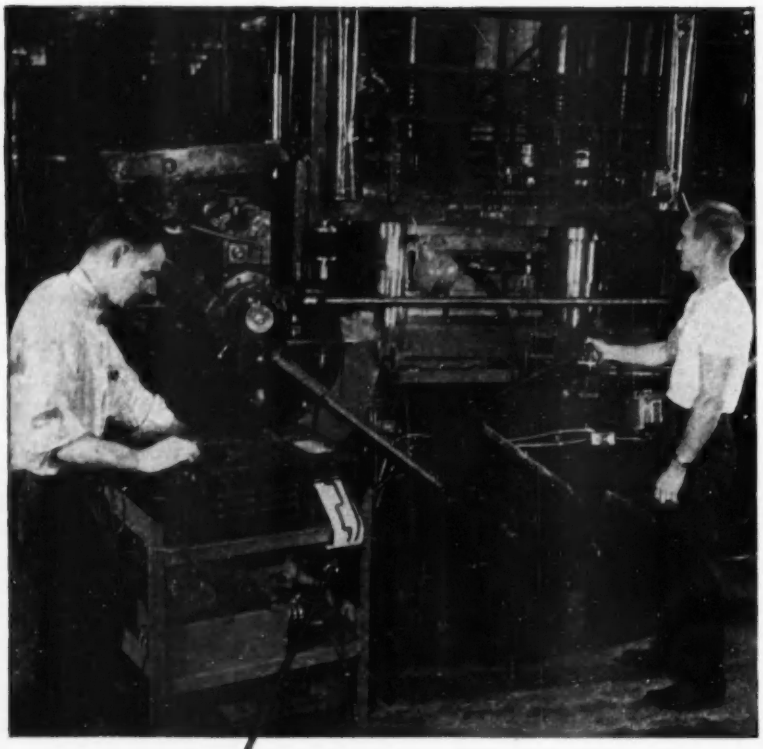
Application Engineering Offices: ATLANTA • CHICAGO (Metropolitan) • CINCINNATI • CLEVELAND DETROIT • HOUSTON • LOS ANGELES (Metropolitan) • NEW YORK (Metropolitan) • PHILADELPHIA PITTSBURGH • ROCHESTER • ROCKFORD • SEATTLE • TULSA • WASHINGTON • WORCESTER

6357

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921



CHECKS PRESS LOADING

with Brush Recording Analyzer

Here, in the plant of a large manufacturer of automotive parts, periodic checks are made on this 150-ton mechanical press to spot possible overloading. With resistance-type strain gages mounted on the press, the signal is amplified and recorded by the Brush Strain Analyzer... producing an *immediate chart record* of press strain.

Since measurements can be made quickly and easily, the Brush Strain Analyzer furnishes a *practical method* of detecting overloading and avoiding costly breakdowns, and lengthening press life.

You can use Brush Recording Analyzers to save time and solve problems... in measurement of strain, torque, vibration, pressure, d-c or a-c voltages or currents, and other variables. Brush representatives are located throughout the United States. In Canada: A. C. Wickman, Limited, Toronto. For bulletin write Brush Electronics Company, Dept. DD-6, 3405 Perkins Avenue, Cleveland 14, Ohio.

BRUSH ELECTRONICS COMPANY

INDUSTRIAL AND RESEARCH INSTRUMENTS
PIEZO-ELECTRIC MATERIALS • ACOUSTIC DEVICES
MAGNETIC RECORDING EQUIPMENT
ULTRASONIC EQUIPMENT

BRUSH ELECTRONICS

formerly
The Brush Development Co.
Brush Electronics Company
is an operating unit of
Clevite Corporation.

Special Saws

(*Continued from page 33*)

trailing edge of the material, in relation to its position in the aircraft, toward the leading edge. Some of the saws pivot about a focal point at one end and ride a profile cam at the opposite end. Others, having an extended focal point, utilize, instead, profile cams at both ends of the saw with feed at each end geared to generate the desired contour. The focal point is determined by the angle of intersection of the per cent lines of the workpiece. Two cuts, one rough and one finish, are taken for close dimensional control.

Operating at 6000 fpm, the saw uses a conventional ⅝-in. wide blade which is driven by a four-hp, air-operated motor. An electric motor is utilized for the feed. Normal feed in open-sectioned honeycomb is 5½ ipm, but this is reduced to three ipm where the honeycomb section is densified. The saw has a rapid traverse of 24 ipm. Martin engineers have incorporated a vacuum cleaner into the head construction to prevent the blade from loading.

Another band saw has been made up to cut up obsolete Kirksite and lead dies for reprocessing. A special skip tooth blade, having a rather wide rake angle, is driven at 900 fpm by a three-hp electric motor. The saw assembly is fully counterbalanced and is capable of sawing through dies up to four ft thick. An adjustable weight is used for counterbalancing the assembly.

Before the saw was designed, dies which were too large to go in the furnace were sometimes burned in half, and sometimes sheared in half on the hydraulic press. It took from six to eight hr to burn one of these large dies in half, and shearing took four hr while with the new saw a large die can be sawed in half in 55 min.

BOOKS...

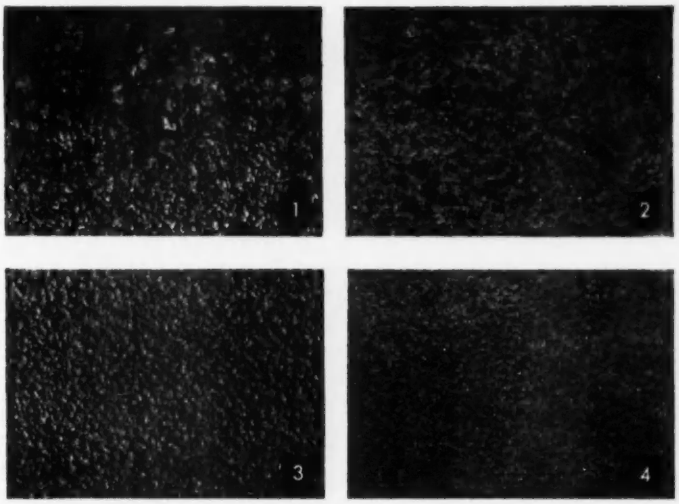
SMALL BUSINESS MANAGEMENT, *published by Delmar Publishers, Orange St. and Broadway, Albany, N. Y. Price, $2.75.* A practical, up-to-date text-workbook for those needing basic instruction in small business operation, this volume covers problems which are an inherent part of every small business from beauty parlors to automobile repair shops. Typical subjects covered include: basic business law; business forms and records; financial problems; location problems; ordering and inventory; layout; and improving the business.

Specify

N·A·X
HIGH-TENSILE STEEL

for

Longer Life through Corrosion Resistance



Photographs show effects of atmospheric corrosion after six years' exposure of unprotected surfaces.

1. Low carbon sheet steel showing friable heavy rust.
2. Low carbon sheet steel with rust removed showing heavy pitting.
3. N-A-X HIGH-TENSILE sheet steel showing tightly adhering rust.
4. N-A-X HIGH-TENSILE sheet steel with rust removed showing absence of excessive pitting.

Low carbon sheet steel lost four times more weight than N-A-X HIGH-TENSILE in six-year test. With increased time this ratio becomes greater.

N-A-X HIGH-TENSILE, having 50% greater strength than mild carbon steel, permits the use of thinner sections—resulting in lighter weight of products. It is a low-alloy steel—possessing much greater resistance to corrosion than mild carbon steel, with either painted or unpainted surfaces. Combined with this characteristic, it has high fatigue and toughness values at normal and sub-zero temperatures and the abrasion resistance of a medium high carbon steel—resulting in longer life of products.

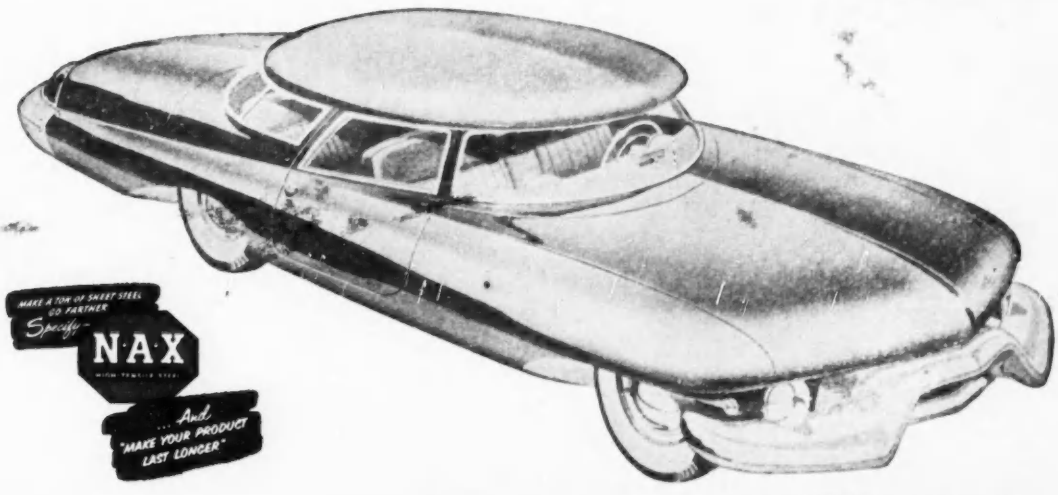
N-A-X HIGH-TENSILE, with its higher physical properties, can be readily formed into the most difficult stamped shapes, and its response to welding, by any method, is excellent. Due to its inherently fine grain and higher hardness, it can be ground and polished to a high degree of lustre at lower cost than can mild carbon steel.

Your product can be made lighter in weight . . . to last longer . . . and in some cases be manufactured more economically, when made of N-A-X HIGH-TENSILE steel.

GREAT LAKES STEEL CORPORATION

N-A-X Alloy Division **Ecorse, Detroit 29, Michigan**

NATIONAL STEEL CORPORATION



KEEP YOUR SCRAP MOVING TO YOUR DEALER

CUTTING 20 GAGE and 5/8" PLATE SIDE-BY-SIDE AT ONE STROKE

Photograph shows operators cutting ⅝" plate and 20 gage sheet steel simultaneously on NIAGARA Power Squaring Shear. No change in knife adjustment is necessary.

The ability of Niagara Power Squaring Shears to cut thick and thin plate both at the same time with the same knife setting is a dramatic demonstration. Visitors at our plant can see this done every day. There is no necessity for tinkering with the knife adjustment.

Demonstrates The Sound Engineering Design of

NIAGARA

POWER SQUARING SHEARS

● There is no compromise with sound, proven engineering when it comes to NIAGARA shear design and construction.

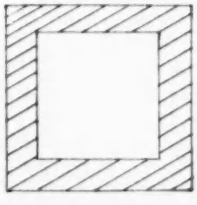
Accurate cutting depends primarily on rigidity of the shear's components.

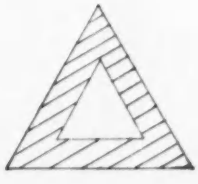
For bed, crosshead and holddown NIAGARA uses CLOSED BOX SECTIONS to resist with minimum deflection the horizontal, vertical and diagonal or torsional loads to which every shear is subjected.

NO OTHER SECTION WILL DO THIS JOB AS EFFICIENTLY.

Angle or channel shaped sections have long since been abandoned for use on NIAGARA Power Shears.

The economy of quality is remembered long after price is forgotten.





BED, CROSSHEAD & HOLDDOWN DESIGN

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK

DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK

Materials Handling Industry

(Continued from page 49)

Mr. Drake went on to say that many devices used in automation have been on the market for years, and that we are just beginning to appreciate their potentialities. He said, "It is because we materials handling men take this approach (the search for better methods) that automation will become one of the primary handling systems of the future."

Besides being very active, the technical sessions were very well attended. At one session engineers asserted that the U. S. military warehouses are far ahead of industry in operator training and safety programs. Speakers suggested that plants install a licensing system to prevent casuals from operating lift trucks.

The integration of the materials handling engineer into a "team" composed of production, tool, mechanical, process and design engineers was urged at one of the sessions. One example of the usefulness of such an approach was cited in the case of a manufacturer of automotive mufflers who designed a 49 in. muffler when all the tote boxes in the plant were limited to 48 in. Redesigning the product effected large savings in handling costs, it was said.

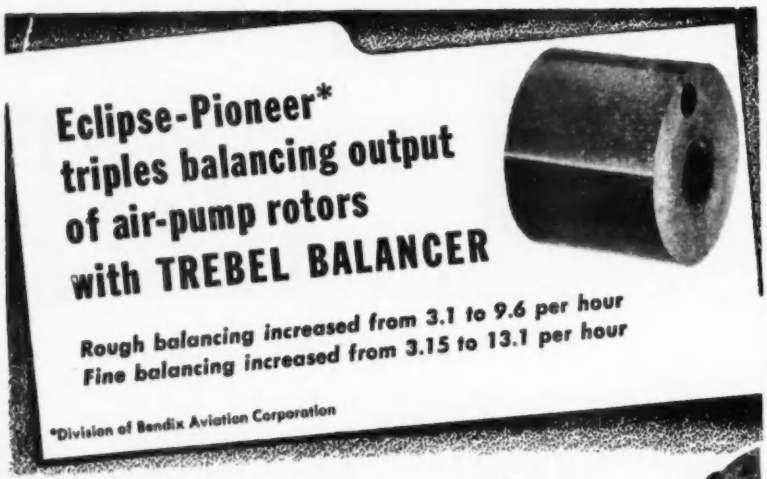
Another procedure urged by the engineers was a statistical checking of goods by the receiving department instead of a case-by-case check. The occasional loss encountered when goods are below standard in quality or quantity is more than offset by lowered handling charges, it was pointed out.

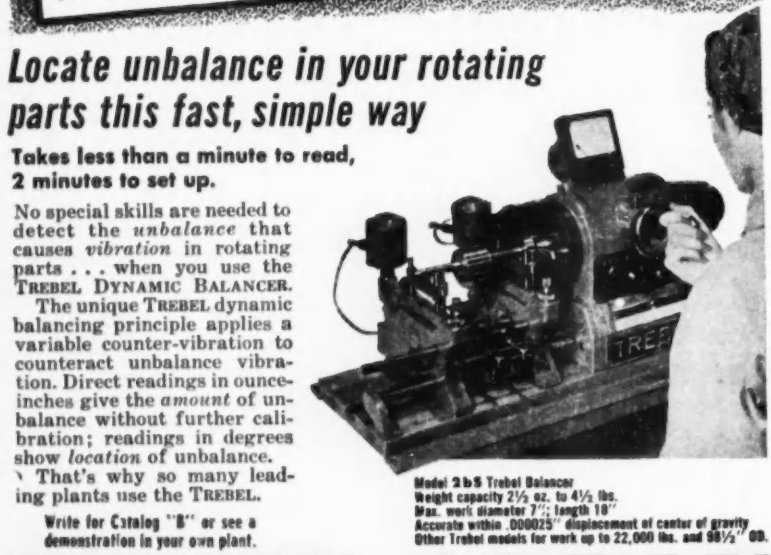
There was considerable interest centered around a new phrase, intermediate packaging, designed to overcome recent trends toward shipment in big containers. In the meeting, speakers pointed out that it is uneconomical to package and ship goods in small quantities and that standardization in large quantities is more economical for both large and small users. However, it was stated that the smaller distributor or retailer needs an intermediate, or smaller package within the larger container to make his own handling of goods economical.

Other speakers at the workshop seminars stressed the need for more easily maintained pallets. Increasing costs of repairs are claimed to be making it necessary to use expendable pallets, of paper or plywood where feasible. It was pointed out that there is an increasing willingness on the part of suppliers to make shipments on pallets to facilitate unloading at the receiving factory. Many suppliers now realize that shipping costs are reduced through unit loading and that it is cheaper to leave the load on the pallets.

The much discussed features of industrial trucks display at the show fall into two categories—body design and transmission-engine design. In the first group, three makers showed vehicles having what may be termed modernistic body styles. Two makers displaying gasoline-electric trucks compose the second classification.

Clark, Automatic, and Hyster have designed lift trucks that are modernly as well as functionally styled. The Clark model X-70 is an experimental model, while the other trucks will go into production. Among the functional aspects cited for the new trucks


Eclipse-Pioneer* triples balancing output of air-pump rotors with TREBEL BALANCER
Rough balancing increased from 3.1 to 9.6 per hour
Fine balancing increased from 3.15 to 13.1 per hour
*Division of Bendix Aviation Corporation


Locate unbalance in your rotating parts this fast, simple way
Takes less than a minute to read, 2 minutes to set up.
No special skills are needed to detect the *unbalance* that causes *vibration* in rotating parts . . . when you use the TREBEL DYNAMIC BALANCER.
The unique TREBEL dynamic balancing principle applies a variable counter-vibration to counteract unbalance vibration. Direct readings in ounce-inches give the *amount* of unbalance without further calibration; readings in degrees show *location* of unbalance.
That's why so many leading plants use the TREBEL.
Write for Catalog "B" or see a demonstration in your own plant.
Model 2 bS Trebel Balancer
Weight capacity 2½ oz. to 4½ lbs.
Max. work diameter 7"; length 10"
Accurate within .000025" displacement of center of gravity
Other Trebel models for work up to 22,000 lbs. and 98½" OD.
KO
KURT ORBAN COMPANY, INC.
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Canadian sales by European Machinery Ltd., 11 King St. West, Toronto, Canada.

STROMBERG

CARBURETORS

Lasting

Performance in Today's Cars Will be Tomorrow's Strongest Selling Point!

Today, more than ever, new car buyers are looking for features that assure long, satisfactory performance. Engine components that contribute to this accomplishment now assume even greater importance as they not only influence today's sales, but become tomorrow's strongest selling point.

For owner loyalty as well as immediate sales, it pays to specify Stromberg* — the carburetor built for *lasting performance*.

*REG. U. S. PAT. OFF.

ECLIPSE MACHINE DIVISION OF
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• Service Sales: South Bend, Ind.
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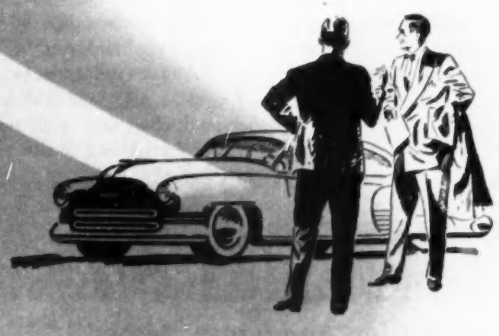

were: lower maintenance costs because the trucks are sheathed under metal and thus can be washed more easily; no protruding parts to cause accidents; and easier accessibility to working parts because hoods lift in one piece. Better styling has also led to such functional advantages as a control panel on the dashboard instead of under the seat, and broader seats so that a driver can peer ahead of his load from either side of the vehicle. (For complete coverage of the new industrial trucks as well as many other products at the show, see the May 15 issue of AUTOMOTIVE INDUSTRIES.)

Automatic and Baker-Raulang both displayed gasoline - electric drive trucks. This type of drive system is incorporated in the newly designed Automatic unit, called the Dynamotive. The Baker truck, named the Gas-O-Matic, uses a Hercules engine directly connected to a variable voltage generator which in turn is connected to an electric drive motor on the drive axle by suitable wiring.

Another feature of the show was the widespread use of radio and television to demonstrate how industrial trucks can be controlled throughout a large plant from a central source by the use of such equipment.

Money-Saving Packaging

(*Continued from page* 42)

to handle as possible: Try to hold weight within the limits of 30 to 50 lb. Small packages may be handled in wirebound pallet boxes. For maximum stability in stacking, the height of a package should be less than the width or the length. Perfect cubes are difficult to palletize. To utilize the maximum strength of the container, design the package so that the corrugation runs vertically when the package is stacked.

Many specific methods are used for packaging odd-shaped products at Studebaker, Mr. Evans said. Heavy items requiring protective packaging are sometimes packed in wirebound boxes. Special interior packing for odd shapes is provided for a large proportion of corrugated cartons. Also used are wood boxes, plywood boxes, crates, fibre containers, latex seal envelopes, polyetheline bags, padded shipping bags, excelsior pads, strapping, bundling, and wrapping materials.

"Doughnut" production up 500% with Iron Hand

Here's some food for thought: a top manufacturer of motor lamination "doughnuts" multiplied his production rate *five times* by installing an automatic press setup with a Sahlin Iron Hand unloader.

What does this mean to *you?* With increased production the theme of practically every industrial operation, you can't overlook the time-saving, cost-cutting advantages of the Iron Hand. This automatic unloader boosts production by enabling presses to operate at full-cycle capacity. In the setup shown here, the Iron Hand operates at speeds over 37 strokes per minute. And the results speak for themselves.

Then, too, the Iron Hand is ideal safety equipment, minimizing the possibility of accidents that often result from manual handling of sharp-edged stampings. And, on many applications, manhour productivity can be substantially increased because automatic unloading permits transfer of operators to other jobs.

If you're seeking higher production from your punch presses, investigate the Sahlin Iron Hand. Write today for our catalog.

Representatives in:
Cleveland
Dayton
Pittsburgh
Philadelphia
Indianapolis
Los Angeles
San Francisco
Seattle
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Milan

sahlin to raise press room standards
engineering company
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NEW!

EVANITE

the only battery separator with all these advantages!

Uniform high quality—every Evanite separator is identical whether you compare two or two million.

Evanite is an improvement over nature! Wood has long been recognized as the most satisfactory low cost separator material. Now the new Evanite *interwoven wood fibre* separator utilizes wood in improved form. Evanite separators, tested in 20,000 batteries in daily use up to three years, have delivered more than their guaranteed battery life without a single separator failure.

Write today for full details on Evanite—Made *only* by Evans Products Company, Western Division, Dept. P-6, Plymouth, Michigan. Mills at Coos Bay, Ore.; Roseburg, Ore.; Vancouver, B. C.

Ask your battery manufacturer for complete product and case history information on the advantages of Evanite.

Compare These Advantages of Evanite Separators

TESTED IN 20,000 VEHICLES for periods up to 3 years under actual operating conditions.

OUTSTANDING PERFORMANCE, equalling or surpassing conventional separators.

NO SPLITS, NO CRACKS—Completely uniform. No candling required.

NO TREATING, NO WET HANDLING—Treated at the factory and shipped *dry*.

CUTS SHIPPING COSTS—Much lighter than ordinary separators.

ECONOMICAL—Cost no more than ordinary treated wood separators.

BACKED BY EXPERIENCE—Produced by Evans, whose years of experience are your assurance of finest quality.

EVANS — ***WORLD'S LARGEST MANUFACTURER OF BATTERY SEPARATORS***

More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from April 27, 1953, to May 26, 1953. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

—A—

Ainsworth Manufacturing Corporation, Detroit, Michigan
Vehicle parts—1900—$26,733

Air Associates, Inc., Teterboro, N. J.
Actuators—Various—$139,737

Albert-Harris, Inc., Akron, Ohio
Vehicle parts—800—$512,962

R. C. Allen Business Machines, Grand Rapids, Michigan
Indicator—2457 ea—$515,637
Indicator—739 ea
Indicator—1298 ea

American Machine & Metal, Inc., U. S. Gauge Div., Sellersville, Pa.
Indicator, oil pressure—2550 ea—$121,138

O. L. Anderson Company, Inc., Detroit, Michigan
Vehicle parts—4500—$72,117

Armstrong Rubber Company, West Haven, Conn.
Tires—1064—$35,186

—B—

Sawyer Bailey Corp., Buffalo, N. Y.
Combat parts—1300—$653,502

Bendix Aviation Corporation, South Bend, Indiana
Vehicle parts—1000—$32,150

Bendix Aviation Corp., Bendix Products Div., South Bend, Ind.
Wheel assys.—324 ea—$1,225,690
Wheel assys.—624 ea
Wheel assys.—48 ea
Wheel assy., nose—164 ea—$37,605
Wheel assy., nose—45 ea
Brake assembly—393 ea—$1,073,220
257 ea
490 ea
Strut assy.—Various—$260,521
Wheel assemblies—398 ea—$84,771
Wheel assemblies—495 ea
Wheel assemblies—314 ea

Bendix Aviation Corp., Eclipse Pioneer Div., Teterboro, N. J.
Indicator—1044 ea—$199,349
Indicator—33 ea
Indicator—102 ea
Accelerometers—890 ea—$33,233
Accelerometers—2777 ea
Bracket & bushing assy.—39,000 ea—$204,943
Fuel indicator—932 ea—$64,675
Indicator—3644 ea—$174,410
Indicator, oil pressure—2575 ea—$125,588
Indicator—40 ea—$84,911
4 ea
35 ea

Bendix Aviation Corp., Scintilla Magneto Div., Sidney, N. Y.
Spares—$361,757

Blackstone Corporation, Jamestown, N. Y.
Vehicle parts—7000—$153,090

The Budd Company, Detroit, Michigan
Vehicle parts—1500—$75,420

—C—

Campbell Chain Company, York, Pa.
Tires—24,000—$129,240

Carron & Company, Inkster, Michigan
Vehicle parts—2500—$59,697

Champion Spark Plug Company, Toledo, Ohio
Aircraft spark plug — 1,400,000 ea — $2,100,000
Aircraft spark plug — 105,930 ea — $158,895

Chrysler Corporation, Detroit, Michigan
Vehicle—5500—$32,835

Clark Cable Corp., Cleveland, Ohio
Vehicle parts—25,000—$28,500

Cleveland Pneumatic Tool Company, Cleveland, Ohio
Piston—2 ea—$283,353
Strut—9 ea
Piston—18 ea
Strut assy.—12 ea—$33,264

Coach & Car Equipment Corp., Chicago, Illinois
Vehicle parts—350—$31,660

(*Turn to page 103, please*)

PRINT CANS—TUBES—CYLINDERS
as you need them...as you pack them

NEW AUTOMATIC CYLINDAPRINTER
eliminates need for pre-printed containers . . . cuts costs . . . solves inventory problems.

Automatically prints complete identification copy or changeable codes, lot numbers . . . on the production line.

- **May be fed automatically or manually . . . feeding need not be regularly spaced or timed**
- **Operates at variable speeds up to 80 units per minute**
- **Prints equally well on loaded or empty cylinders**
- **Adjusts quickly for cylinders of different diameters and lengths**
- **Copy changes made in minutes**
- **Makes sharp, permanent, "print-quality" impressions on smooth or rough surfaces . . . fibre, paper, metal, plastic, etc.**
- **Uses instant-drying inks of almost any color (including metallic) to meet government and civilian specifications**
- **Holds 8-hour supply of ink**
- **Designed for easy clean-up**

Write for details on the "AUTO-CYLINDAPRINTER" today

Gottscho

ADOLPH GOTTSCHO, INC.
Machines to Mark Whatever You Make
Hillside 5, N. J.

50TH YEAR

What Salisbury engineers said to Mr. Spicer

When the Spicer people bought the Salisbury Axle Company in 1919, the advantages of Salisbury Axles had been widely used in automobiles and trucks since 1906.

As the Salisbury engineers pointed out to Mr. Spicer, and our young president, C. A. Dana, when the purchase was being considered, "This axle has distinctive features you can't find in any other unit. We've just had several years of front- and rear-drive war service — the kind that no axles have ever had before. Our design is good. That will be proved by its increasing acceptance through the years ahead."

During the past 34 years, Spicer has made millions and millions of Salisbury Axles for a wide range of civilian and military uses.

Designing, Developing, Engineering, Manufacturing and Servicing

Spicer

The Axles with Accent on *ACTION!*

The Spicer Salisbury Axle for passenger car and light commercial use has every qualification for extremely high efficiency in today's vehicles:

RIGIDITY—The special Spicer design and construction maintain accurate alignment of gears and bearings under all speeds and loads, assuring continued quiet operation.

LUBRICATION—Scientifically developed control of oil circulation provides a constant, correctly proportioned flow to all gears and bearings for effective lubrication and cooling.

RUGGEDNESS—Sturdily constructed to withstand the high speeds and extremes of punishment which are common in modern automotive vehicle operation.

ACCESSIBILITY—Extremely easy to get into for inspection of parts. Simple-to-remove gear cover, oil level and drain plugs reduce service time and costs.

Spicer facilities in its ten modern plants are geared to the production of Salisbury Axles for your particular needs.

SPICER MANUFACTURING DIVISION
of Dana Corporation
TOLEDO 1, OHIO

49 YEARS OF **Spicer** SERVICE

ENGINEERING **DANA** MANUFACTURING

TRANSMISSIONS • UNIVERSAL JOINTS • BROWN-LIPE AND AUBURN CLUTCHES • FORGINGS • PASSENGER CAR AXLES • STAMPINGS • SPICER "BROWN-LIPE" GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES • WELDED TUBING

(*Continued from page* 100)

Continental Aviation & Engineering Corp., Detroit, Michigan
Modification of engines — 102 ea — $52,360
Modification of engines—8 ea
Turbo jet engine—14 ea—$100,000
Cooper Tire & Rubber Company, Findlay, Ohio
Tires—2800—$44,800
Tires—2000—$54,200
Cuno Engineering Company, Meriden, Conn.
Vehicle parts—15,000—$51,900

— D —

Denman Rubber Manufacturing Co., Warren, Ohio
Tires—1400—$35,658
Diamond T Motor Car Company, Chicago, Illinois
Vehicle parts—2500—$30,780
Douglas Aircraft Company, Inc., Tulsa, Oklahoma
Modification of aircraft—48 ea—$8,176,667

— E —

Easton Manufacturing, Spring Div., Detroit, Mich.
Vehicle parts—15,000—$66,750
Eaton Manufacturing Company, Detroit, Michigan
Combat parts—100,000—$124,167

— F —

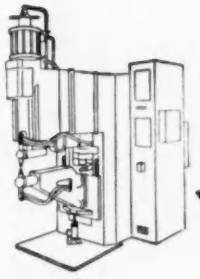
Fairchild Engine & Airplane Corp., Fairchild Aircraft Division, Hagerstown, Maryland
Spare parts—$30,433
Fairchild Engine & Airplane Corp., Fairchild Engine Division, Farmingdale, L. I., N. Y.
Power plants—614 ea—$2,059,981
Fargo Motor Corporation, Detroit, Mich.
Replenishment of trucks—58—$67,284
Felt Products Manufacturing Co., Chicago, Illinois
Vehicle parts—21,600—$35,822
The Firestone Tire & Rubber Company, Akron, Ohio
Parts for 90MM gun—5640—$32,924
Parts for 90MM gun—1800—$41,119
Flexonics Corporation, Maywood, Illinois
Stainless steel assy.—3059 ea—$38,696
Ford Motor Company, Washington, D. C.
Replenishment of vehicles — 146 — 176,149
Replenishment of vehicles — 69 — $212,641

— G —

The Gabriel Company, Cleveland, Ohio
Vehicle parts—37,000—$211,100
Gates Rubber Company, Sales Div., Inc., Detroit, Michigan
Tires—8000—$44,460
General Electric Company, Schenectady, N. Y.
Indicator—566 ea—$58,874
Indicator: tachometer — 2500 ea — $224,560
Indicator—2273 ea—$227,271
Indicator—800 ea—$76,200
General Metal Products Corp., The Moore Eastwood Co. Div., Silmington, Ohio
Tiedown cargo airplanes—9057 ea—$298,881

(*Turn to page* 106, *please*)

HERE'S WHAT WE MEAN BY *Engineering Assistance*



Application Engineers

T-W's Application Engineers work with you on properly applying resistance welding to your product. They give you specific answers and recommendations for your product and your production.

Design Engineers

The Design Engineers are specialists in creating welders specifically for your work. They take over when the Application Engineers have worked up the basic requirements with you.

Field Engineers

T-W has Field Engineers available in the areas near the cities listed here. They can give you on-the-spot, authentic answers to your questions. They will save you a lot of time. When you operate your welding equipment, they are on call to give you service.

Resistance Welders Since 1898

Sales and Service
CHARLOTTE · CHATTANOOGA
CHICAGO · CLEVELAND · DAYTON
DENVER · DETROIT · DALLAS
PHILADELPHIA · PORTLAND, OREGON
SEATTLE · S. PASADENA · ST. LOUIS
STAMFORD · WASHINGTON
DUNDAS, ONTARIO

TAYLOR-WINFIELD
RESISTANCE WELDERS

THE TAYLOR-WINFIELD CORPORATION • WARREN, OHIO

WHAT *Life-Line* REALLY DELIVERS IS MORE SERVICE... LESS SERVICING

What *Life-Line* really delivers is

...more service ...less servicing

"We can't afford equipment breakdowns. We manufacture ice cream making machinery and operate franchise stores throughout the country. Store operators know very little about maintenance. We *must* select equipment that assures trouble-free performance with minimum maintenance. That's what Life-Lines give us. That's why we standardize on them."

The above statement by the chief engineer of an eastern manufacturing plant tells the Life-Line story best. Summed up it means more service, less servicing, with Life-Lines.

Take the Life-Linestarter, for example. Contacts last longer because exclusive "De-ion®" arc extinction snuffs out arcs fast . . . reduces contact pitting. Simple seesaw balance of clapper prevents accidental opening; kickout spring prevents accidental closing. Compare with any other starter and see why Life-Linestarters offer *more service with less servicing.*

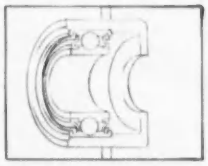
The Life-Line motor's advance design completely eliminates periodic lubrication. Pre-lubricated factory-sealed ball bearings need no greasing attention. Further, steel construction cuts breakage from rough usage. Superior insulation and winding techniques lengthen electrical life. On-the-job reports of a half million Life-Lines show why you get more service with less servicing.

It costs no more to get Life-Line performance. Ask your Westinghouse representative for details or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-21684-A

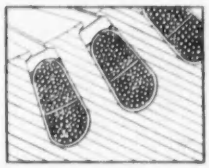
YOU CAN BE **SURE**...IF IT'S

Westinghouse

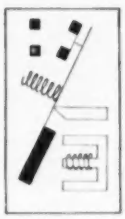


MOTOR

Needs no lubrication. Pre-lubricated factory-sealed bearings eliminate troubles due to under or overlubrication, dust and dirt.

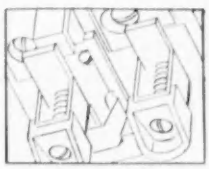


Cuts winding burnouts. Pear-shaped slot design eliminates pockets. No corner voids remain to collect dirt, moisture.



STARTER

Never Jams. No sliding surfaces to wear—no sticking—no jamming—nothing to wear or replace.



Never needs filing. Silver-to-silver contacts eliminate filing. Discolored silver maintains high conductivity.

(*Continued from page 103*)

GMC, AC Spark Plug, Flint, Michigan
Aircraft spark plug—1,455,826 ea—$2,183,739

GMC, BOP Division, Detroit, Michigan
Airplanes—$29,967,522

GMC, Chevrolet Motor Div., Detroit, Mich.
Trucks—821—$1,123,491
Vehicle parts—1008—$1,351,945

GMC, Truck & Coach Div., East Pontiac, Michigan
Replenishment of trucks—29—$206,222
Automotive spare parts—2,704,850—$8,037,824

The General Tire & Rubber Co., Akron, Ohio
Wheel assemblies—334 ea—$38,229
Wheel assemblies—16 ea
Wheel assemblies—73 ea
Wheel assys.—312 ea—$66,674
Wheel assys.—16 ea
Wheel assys.—92 ea
Wheel assy., nose—1245 ea—$70,354
Wheel assy.—158 ea—$46,307
8 ea
45 ea

Gill Electric Manufacturing Corp., Redlands, Calif.
Aircraft batteries—3914 ea—$184,192

The B. F. Goodrich Company, Dayton, Ohio
Wheel assemblies—600—$264,870
Wheel assy.—184 ea—$38,015

Goodyear Tire & Rubber Company, Inc., Akron, Ohio
Wheel assys.—25 ea—$64,736
Wheel assys.—26 ea
Brake assys.—25 ea
Wheel assys.—208 ea—$47,219
Wheel assys.—244 ea—$368,199
Brake assys.
Spare parts & technical data—318 ea
Tires—150—$41,607
Tires—1200—$144,852
Wheel assemblies—375 ea—$760,651

Goodyear Tire & Rubber Company, Inc., Akron, Ohio
Wheel assemblies—50 ea
Wheel assemblies—55 ea
Wheel assy.—$66,701
Brake assy.
Wheel assy.—420 ea—$181,695
Wheel assy.—20 ea
Brake assy.—270 ea

Gould-National Batteries, Inc., Depew, New York
Aircraft storage batteries—6304 ea.—$289,101
Aircraft batteries—5523 ea—$233,346

Grimes Manufacturing Company, Urbana, Ohio
Lighting fixture kits PR 463569-O—900 ea—$114,975

—H—

Hoover Electric Company, Los Angeles, California
Actuator cockpit canopy—358 ea—$89,500

Hughes Aircraft Company, Culver City,
Overhaul—$558,335

—I—

International Harvester Co., Washington, D. C.
Replenishment of trucks—556—$2,082,928

—J—

Jack & Heintz, Inc., Cleveland, Ohio
Generator: tachometer—1930 ea—$71,834
Starters, electrical—790 ea—$170,069

—K—

The Kelley Springfield Tire Company, Cumberland, Maryland
Tires—770—$110,575

Kollsman Instrument Corp., Elmhurst, N. Y
Machmeters—1154 ea—$256,283
Indicator, oil pressure—2550 ea—$122,009

—L—

Larco Spring Manufacturing Company, Richmond, California
Vehicle parts—8000—$39,680

Liggett Spring & Axle Company, Monongahela, Pa.
Vehicle parts—7000—$66,780

Lockheed Aircraft Corp., Burbank, Calif.
Service change kits—$220,000

—Mc—

The McKay Company, Pittsburgh, Pa.
Tires—32,000—$165,941

—M—

Mackenzie Awning Company, Detroit, Michigan
Vehicle parts—2250—$27,439

The Magnavox Company, Fort Wayne, Indiana
Replenishment of small arms parts, 53-1090—4476—$32,451

(*Turn to page 110, please*)

TEST CASTINGS

3 times faster with VACUUM

THE FASTEST, CLEANEST, SAFEST TO TEST FOR LEAKS IN CASTINGS, OIL PANS, HOUSINGS, MECHANICAL SEALS, ETC.

Vacuum testing is the fast, clean, safe method of testing water pumps, cylinder walls, mechanical seals, and similar parts. The **automatic* Whittington Vacuum Tester leaves no margin for operator error . . . if a casting is good, a light glows green . . . if bad, a light glows red. The Whittington Tester is the simplest, most accurate testing device on the market today . . . no submersion, no time consuming plugging of holes, no drying. And, it will test a broad range of parts, many impossible to test by any other method, with no threat of distortion. Let a Whittington engineer help you solve *your* testing problem.

**Also available in semi-automatic and manual models.*

SEND THIS COUPON **Today!**

Gentlemen: Please send full details on the WHITTINGTON Vacuum Tester.

Name.....

Company.....

Address.....

City..... State.....

WHITTINGTON

PUMP AND ENGINEERING CORP.
1126 PROSPECT STREET • INDIANAPOLIS, INDIANA

Save time... slash costs... switch to Black & Decker POWER!

YOU don't have to be an engineering genius to sell yourself on Black & Decker Tools! Their performance hits you right between the eyes as they gobble up job after job . . . saving money, muscle and man hours. Their modern design sticks out in streamlining, light weight and perfect balance that mean easy handling. And their quality construction is proved by tools that put out and pay off for year after year after year!

That's why they've won their spurs with millions of men who take a long, hard look at *any* tool . . . production bosses, maintenance men. That's why we'd like *you* to put them to the test. Ask your friends about them. Ask your nearby Black & Decker Distributor for a demonstration. Write for our free, detailed catalog of over 100 time-saving, cost-cutting Portable Electric Tools to: THE BLACK & DECKER MFG. CO., 606 Pennsylvania Ave., Towson 4, Maryland.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker
PORTABLE ELECTRIC TOOLS

DRILLS . . . Models and speeds to fit any job in capacities from ¼" to 1¼" in steel, double in hardwood. Many attachments.

SANDERS . . . Drive abrasive discs, wire cup brushes, saucer grinding wheels, other attachments. Four models, 7" and 9" capacities.

BENCH GRINDERS . . . Three models, 6"-10" wheel diams., ¼ to 1 H. P., for sharpening, grinding, wire brushing, buffing.

PORTABLE GRINDERS . . . Bring the tool to heavy, bulky, hard-to-move work. Perfectly balanced. 3", 5" and 6" wheel diams.

HAMMERS . . . Drive star drills, bull points, chisels, etc., for work in masonry, other materials. Four models, rated by capacity in concrete for ½" to 2" diam. holes.

PORTO-SHEARS* . . . For fast, accurate cutting of ferrous and non-ferrous sheet metal. Two models, 12 and 16 gage capacities in steel. Cut to small radius.

SCREW DRIVERS . . . Drive anything from delicate screws to large nuts and bolts. Many models, positive and adjustable clutches. 190° angle models for close-quarter work.

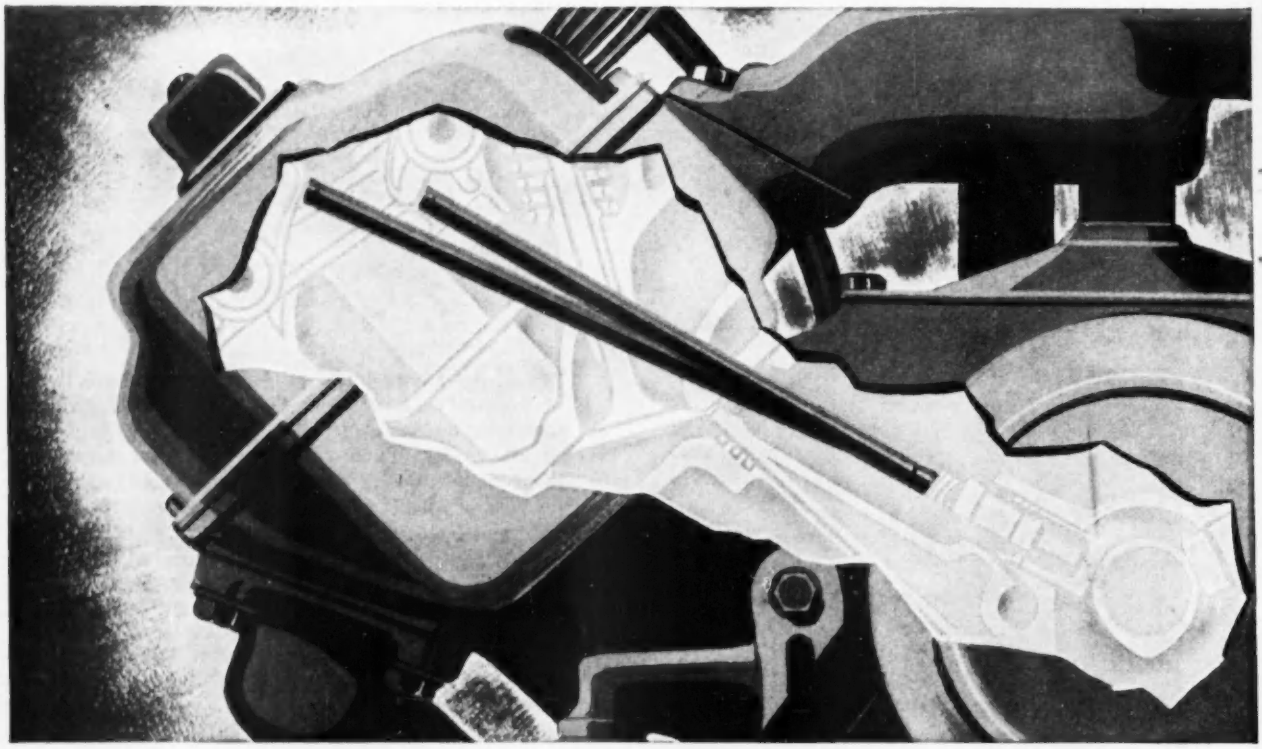
FACTORY SERVICE . . . A Black & Decker *extra!* Nationwide network of company-operated branches within 24 hours of *any* customer provides fast, accurate, reasonable service.

WRITE TODAY FOR 1953 BLACK & DECKER CATALOG. Gives you full details on over 100 Tools and hundreds of useful accessories. Fill out the coupon below or attach it to your letterhead.

*Trade Mark Reg. U. S. Pat. Off.

THE BLACK & DECKER MFG. CO.
606 Pennsylvania Ave., Towson 4, Maryland
Please send me your *free* 1953 catalog of *over* 100 Black & Decker Tools.

Name .....
Company .....
Address .....
City ..... Zone ..... State .....



1 Today's sharp swing toward higher horsepower overhead engines for passenger cars has resulted in many new solutions to old automotive problems. One result: Push rods of Bundyweld Tubing, long proved in truck engines.

Push rods of Bundyweld Tubing called for by newest trend in engine design

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

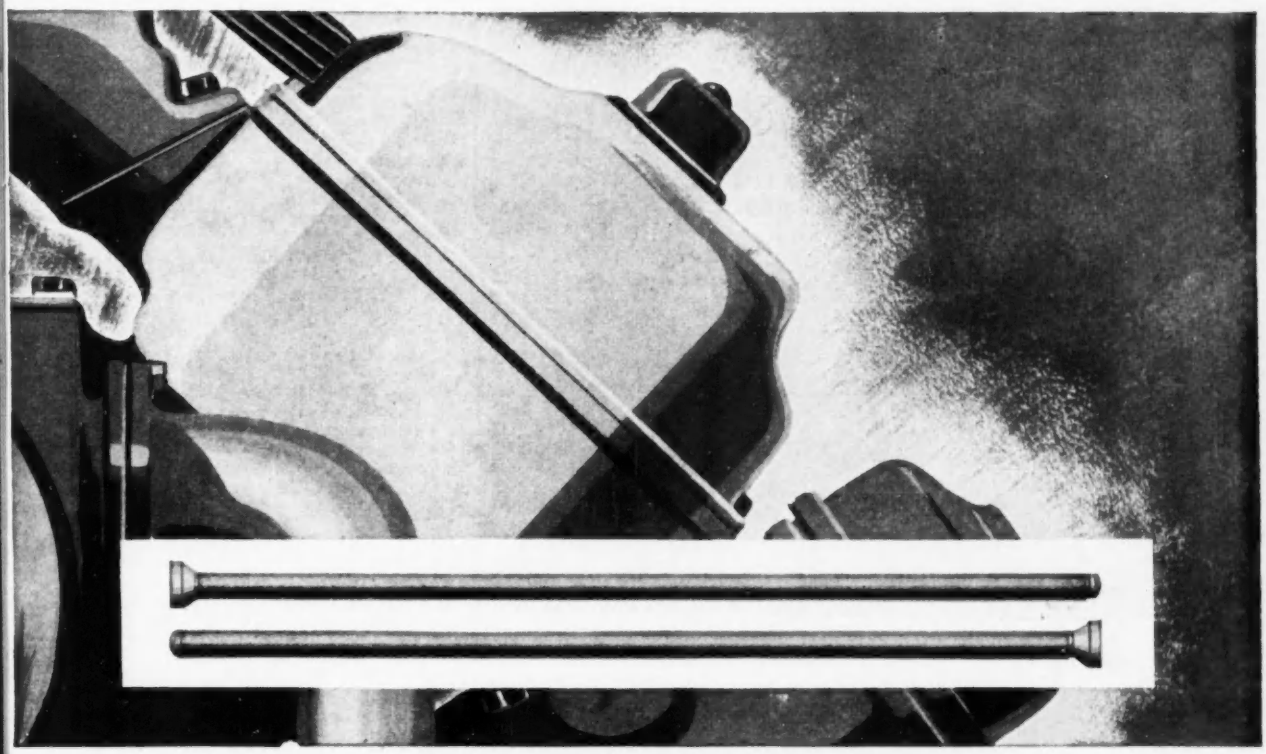
continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Copper coating fuses with steel. Result . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

← **NOTE** the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: *Cambridge 42, Mass.:* Austin-Hastings Co., Inc., 226 Binney St. • ***Chattanooga 2, Tenn.:*** Poirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • ***Chicago 32, Ill.:*** Lapham-Hickey Co., 3333 47th Place • ***Elizabeth, New Jersey:*** A. B. Murray Co., Inc., Post Office Box 476 • ***Philadelphia 3, Penn.:*** Rutan & Co., 1717 Sansom St. • ***San Francisco 10, Calif.:*** Pacific Metals Co., Ltd., 3100 19th St. • ***Seattle 4, Wash.:*** Eagle Metals Co., 4755 First Ave., South ***Toronto 5, Ontario, Canada:*** Alloy Metal Sales, Ltd., 181 Fleet St., East • **Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.**



2 Tough, lightweight push rods of hardened Bundyweld reduce cam load, increase efficient function of entire valve train. Bundyweld fabricates more easily than the material it replaces, results in more uniform, better finished parts.

Push rods of Bundyweld, long used in powerful truck engines, help improve performance of powerful overhead-type passenger-car engines.

The improved push rods in the overhead engines of some of today's most popular cars are made of lightweight Bundyweld Tubing.

Lightweight push rods of Bundyweld reduce load on cam, and, of course, the entire valve train follows the cam more closely. The design engineer is thus able to produce a more efficient, more powerful overhead engine in keeping with today's constantly growing trend.

The tubing: Bundyweld is the only tubing double-walled from a single metal strip, with patented beveled edges. It's SAE 1010 steel, copper-bonded throughout 360° of wall contact into a strong, lightweight beadless tubing. Wall thickness and concentricity are uniform, accurate. Ultimate tensile strength, yield strength, and fatigue limit are exceptionally high.

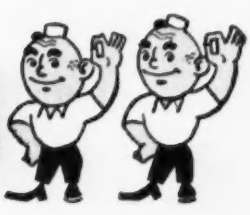
Engineering help: If you'd like help in determining how to apply Bundyweld toward solving your push rod problems, why not talk things over with one of our experienced automotive tubing engineers? You'll find them a prime source of sound information and ideas—not only on push rods but on other tubing applications.

Production: We're already mass-producing Bundyweld for automotive push rods. And, naturally, we're ready to give you the same high-volume, low-cost service we're giving others. We'll ship Bundyweld—cold drawn to proper hardness, held to specified low camber tolerances—right on schedule.

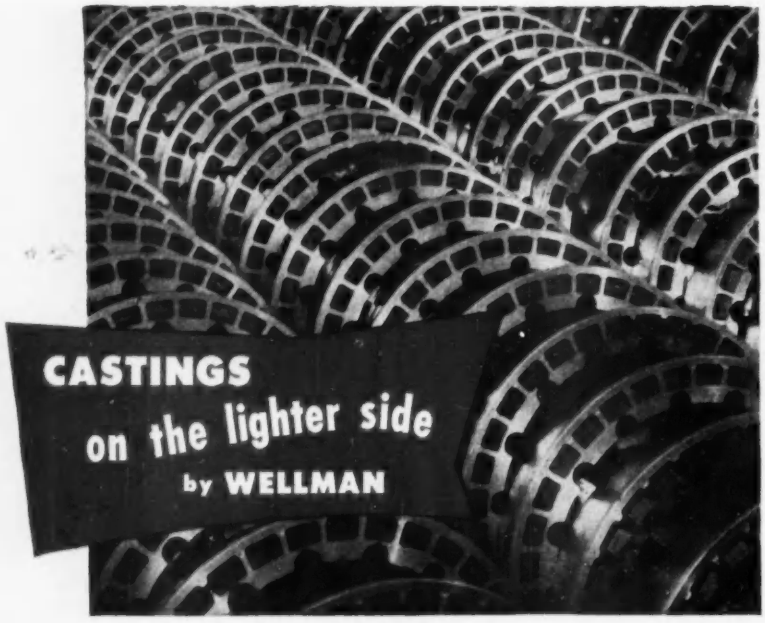
Let us show you what we've done—and what we can do for you—with push rods of Bundyweld Tubing. Perhaps you'd like to check into Bundyweld for your gasoline, oil, hydraulic window or brake lines, too. For details, write Bundy Tubing Company—world's largest producer of small-diameter tubing.

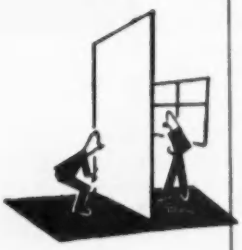
BUNDY TUBING COMPANY • DETROIT 14, MICHIGAN

Bundyweld® Tubing



DOUBLE-WALLED FROM A SINGLE STRIP





If you're thinking along the lighter side about the whole subject of magnesium and aluminum castings, think about Wellman as a source.

As the contractor, standing in one room of his new inexpensive house, said to a friend in the next room, "You can *hear* me, but you can't *see* me? Them's some walls, ain't they!" . . .

"Them's some walls" on a Wellman lightweight magnesium casting, too, thin in appearance but tough enough for our biggest jet bomber landing wheels . . . and easy to machine!

Let us show you how our four complete plants and almost a half century of experience can help you. Write for our new catalog No. 53.

Well-Cast **MAGNESIUM AND ALUMINUM CASTINGS**
Well-Made **WOOD AND METAL PATTERNS**

THE WELLMAN BRONZE & ALUMINUM CO.
Dept. 3 12800 Shaker Boulevard Cleveland 20, Ohio

(*Continued from page* 106)

The Mansfield Tire & Rubber Company, Mansfield, Ohio
Tires—9380—$51,167
Maremont Auto Products, Inc., Chicago, Ill.
Vehicle parts—1470—$77,175
Michiana Products Corp., Michigan City, Indiana
Vehicle parts—850—$140,693
Midvale Steel Company, Nicetown, Phila.
Vehicle parts—624,300 lb—$244,038
52 pcs
Mohawk Rubber Company, Akron, Ohio
Tires—400—$72,196
Tires—1656—$116,700
Tires—100—$27,288
Monroe Auto Equipment Company, Monroe, Michigan
Vehicle parts—20,500—$382,325
Vehicle parts—18,000—$31,770
D. Moody & Company, Tulsa, Oklahoma
Heater assy.—475 ea—$27,219

—N—

Napco-Detroit, Inc., Pontiac, Michigan
Vehicle parts—4200—$35,742
New Center Studios, Detroit, Michigan
Vehicle parts—2630—$44,400

—O—

Ohio Hoist & Manufacturing Company, Cleveland, Ohio
Tiedown cargo airplane—40,450 ea—766,932
Ohio Steel Foundry Company, Lima, Ohio
Castings for 120MM gun—50—$76,-510

—P—

Pacific Tire & Rubber Company, Oakland, Calif.
Tires—3200—$80,928

—R—

Regent Jack Manufacturing Co., Downing, Calif.
Hydraulic aircraft jacks—1039 ea—$860,962
Republic Aviation Corp., Farmingdale, L. I., N. Y.
Airplane—1ea—$600,000
Training units—4 ea—$1,219,364

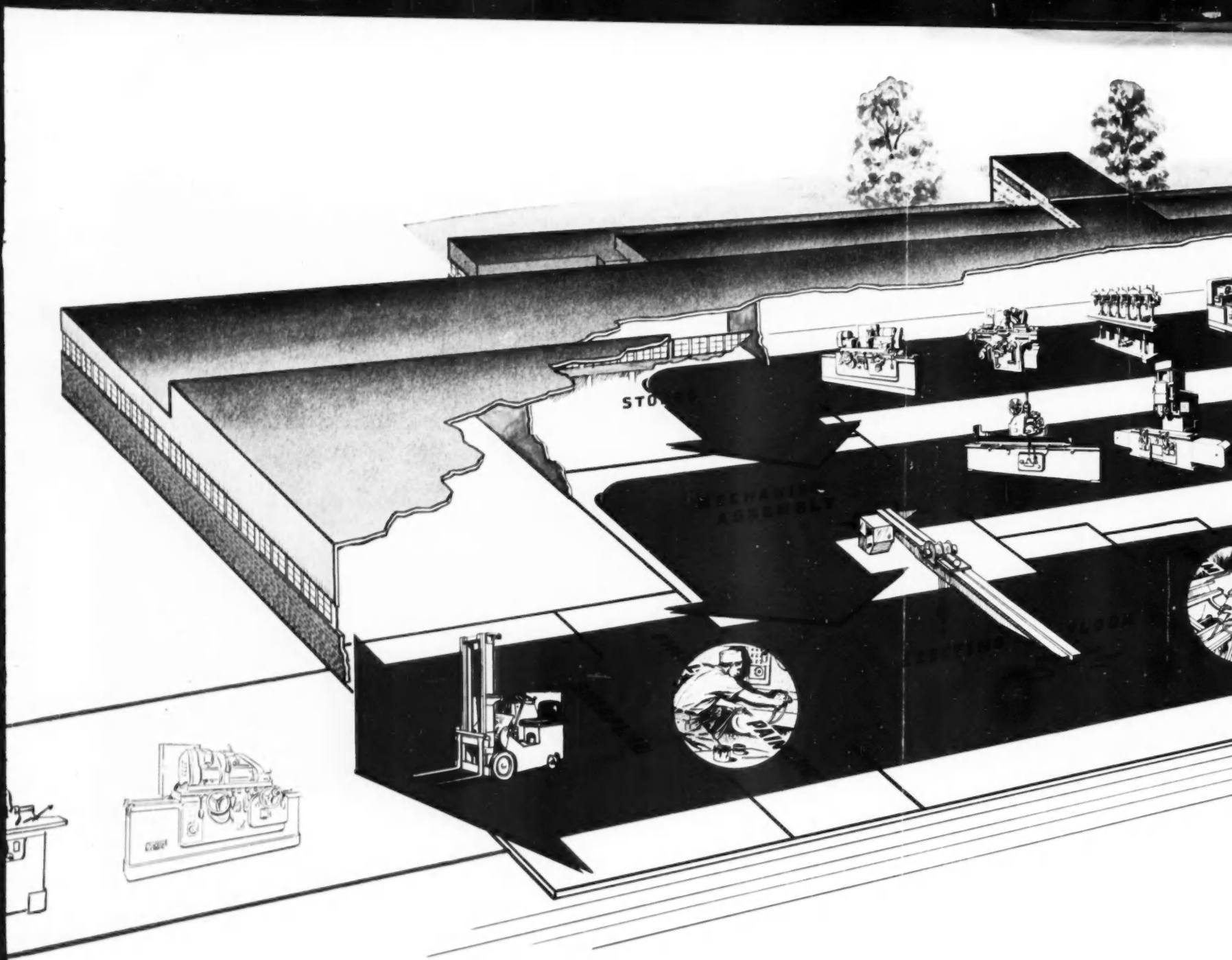
—S—

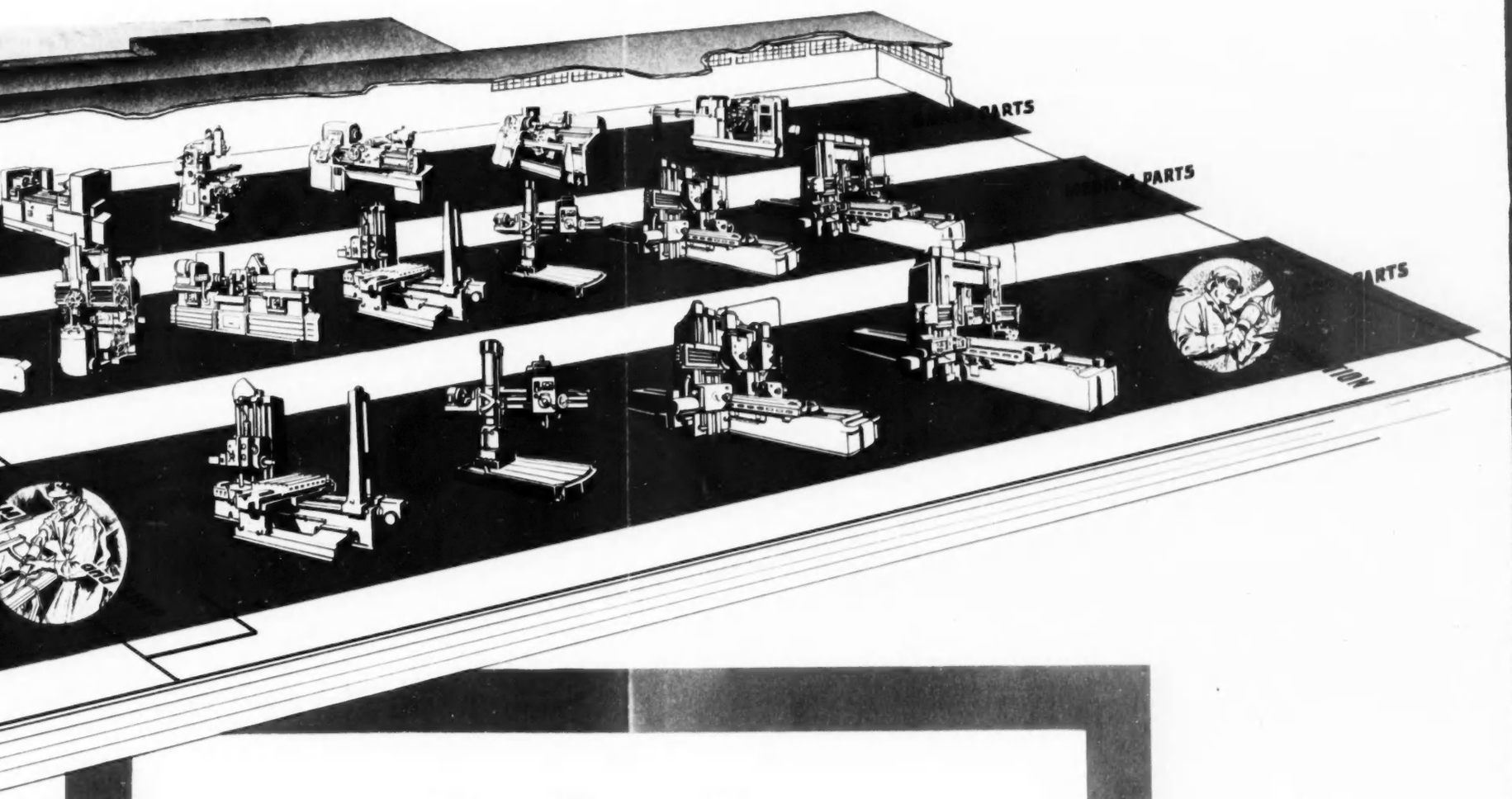
Seastrom & Company, Indianapolis, Indiana
Vehicle parts—4000—$25,415
Serv-Wel Tool & Engineering Company, Dearborn, Michigan
Vehicle parts—1000—27,500
Seeger Refrigerator Company, St. Paul, Minnesota
Tank assy.—5000—$1,079,780
Soderberg Manufacturing Company, Inc., Alhambra, California
Light assy., cockpit—18,792 ea—$105,235
Solar Aircraft Corporation, San Diego, Calif.
Parts—Various—$54,407
Sperry Gyroscope Co., Sperry Corp., Great Neck, L. I., N. Y.
Automatic pilot—$70,530
Maintenance parts—Various—$26,197
Standard Electrical Products Company, Dayton, Ohio
Relay—925 ea—$55,500
(*Turn to page* 117, *please*)

Opening New Doors to the Future...

to Give Industry the

"TOUCH OF GOLD"


STO
MECHANICAL
ASSEMBLY
PAINT



Flow Chart of the
New Norton Grinding Machine Plant
AT WORCESTER, MASS.

Open as a baseball diamond although many times larger. Production flows in-line, unusual in the construction of machine tools. Five major production lines are in operation, two for heavy castings and three for medium to small parts. Departmentalization has been eliminated in favor of continuous processing. Back-tracking and trucking are at the irreducible minimum. In this big ultra-modern fabricating plant, Norton Grinding and Lapping Machines are being built better than ever.

NORTON COMPANY

MAIN OFFICES AND WORKS • WORCESTER, MASS.

NORTON

ABRASIVES AND GRINDING WHEELS • GRINDING AND LAPPING MACHINES • REFRACTORIES AND LABORATORY WARE
BORON CARBIDE GRAIN AND MOLDED PRODUCTS • PULPSTONES • NON-SLIP FLOORS • LABELING MACHINES

WORCESTER 6, MASSACHUSETTS

June 1, 1953

To Our Customers
and Other Friends:

We are now operating our new Grinding Machine plant at Worcester, Mass.

It is a new seven-acre plant of Norton Company that has grown up making better products to make other products better. We believe it is the most modern plant of its kind in the world. It will help us serve our many customers better.

However, in a larger sense we see this as much more than the mere opening of an additional plant. It symbolizes the Norton attitude toward American industry of the future. As the demand for greater precision and finer finish in products increases, the part grinding and lapping plays becomes more important. We think that we are actually anticipating industry's needs in this new plant - not merely keeping in step with progress.

We often speak about Norton Grinding Machines and Wheels giving your men in the shop the "Touch of Gold". This means that every time a Norton wheel on a Norton machine grinds a product in process it adds to its value and usefulness. You add to your profit margin without having to add to price. It is part of the American way of making goods better, faster, at lower cost. That is what this new plant is for.

This new plant will enable us to turn out better grinding machines in shorter time. We have greatly regretted that some customers have had to wait for certain types of machines, but we think that their patience will be rewarded by the finest machines we have ever produced in our half century of business. Deliveries are improving as the expanded facilities come into full use and we should now be able to meet all of your requirements.

Please accept this as a personal invitation to visit us at Norton Company any time you are in New England. We feel sure you will find it interesting, inspiring and rewarding.

Sincerely yours,

NORTON COMPANY

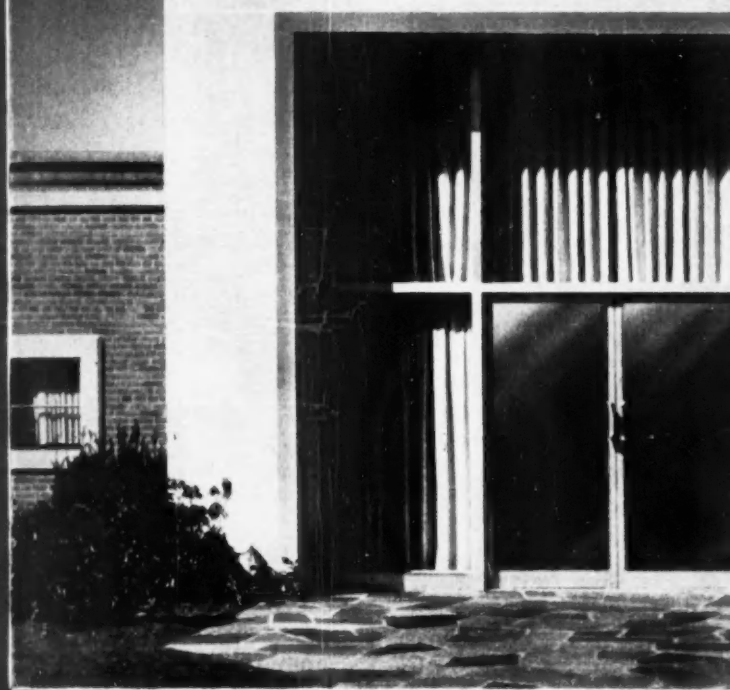
Milton P. Higgins

President

Opening New Doors to

NORT

GRINDING MACHINE



to Give Indust

"TOUCH OF

to the Future...

TON

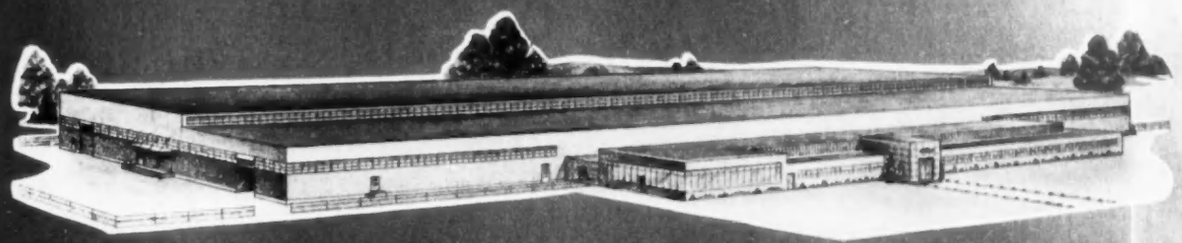
E DIVISION

stry the

F GOLD"

You are cordially invited

...to the Grinding Machine Division's New Home



Your Norton Man Knows. He will be glad to talk with you at a planning level basis. As you look to the future in your own business, you can call upon the world's largest source of grinding machines, abrasives and abrasive products for the most recent developments in grinding operations. Or, if you wish, write direct for more information on any project you may now have under consideration. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

ONLY NORTON OFFERS YOU OVER 50 YEARS OF COMBINED EXPERIENCE IN:

ABRASIVES AND GRINDING WHEELS

PLUS

MACHINES FOR

Cylindrical Grinding • Surface Grinding
Cylindrical and Flat Lapping
Universal Tool and Cutter Grinding
Universal Multipurpose Grinding
Specialized Grinding • Crankshaft Grinding
Cam, Shaft and Contour Grinding
Roll Grinding

FREE-FLOW PRODUCTION is the method employed in this new Norton plant. This is a scene in the production line for medium weight parts. Note how freely material-handling trucks can move in and out — how accessible the work is — how openness, controlled ventilation and perfect light add to workers' efficiency and morale.

NORTON *Making better products to make other products better*

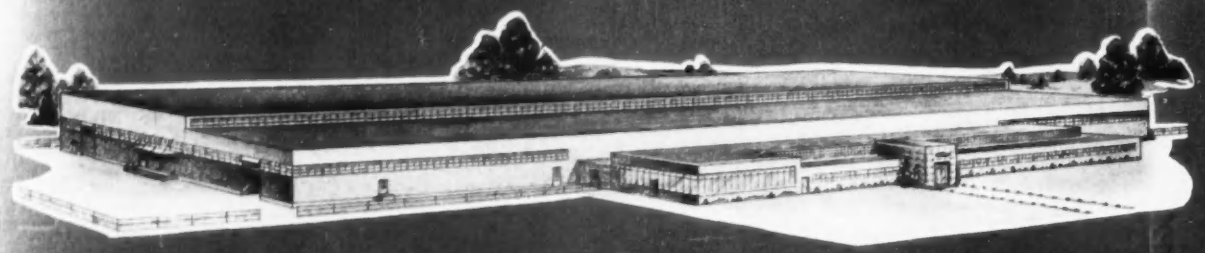
NORTON COMPANY, MACHINE DIVISION, WORCESTER 6, MASS.

District Sales Offices: Hartford • New York • Cleveland • Chicago • Detroit
In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

Printed in U. S. A.

You are cordially invited

...to the Grinding Machine Division's New Home



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(*Continued from page* 110)

Stewart Warner Corp. Chicago, Illinois
Vehicle parts—5800—$25,119
Studebaker Corporation, South Bend, Indiana
Parts—10,000—$76,000
Vehicle parts—6100—$124,908
Sunbeam Corporation, Chicago, Ill.
Indicator: tachometer — 1387 ea — $160,158
Indicator—440 ea—$50,432

—T—

Tempco Aircraft Company, Dallas, Texas
Modification of C-97 aircraft—51 ea—$3,912,000
Thompson Products, Inc., Detroit, Mich.
Vehicle parts—13,100—$52,217
Vehicle parts—20,000—$52,720
Trico Products Corporation, Buffalo, N. Y.
Vehicle parts—14,500—$88,421

—U—

United Motors Service Div., Detroit, Mich.
Vehicle parts—6000—$202,380
Vehicle parts—10,000—$38,900
Vehicle parts—9500—$313,365
United Sales Rubber Company, Detroit, Mich.
Tires—5460—$90,336

—V—

Varnatherm Products Div., Detroit, Mich.
Vehicle parts—16,000—$72,160
The Vendo Company, Kansas City, Missouri
Control panel—10,000 ea—$128,400

—W—

Westinghouse Electric Corporation, Dayton, Ohio
Regulators—1402 ea—$794,861
Regulators—140 ea
Regulators—1006 ea
Circuit breaker—440 ea—$94,877
Regulators—441 ea—$103,877
Generators—240 ea—$607,369
Relay—457 ea—$29,823

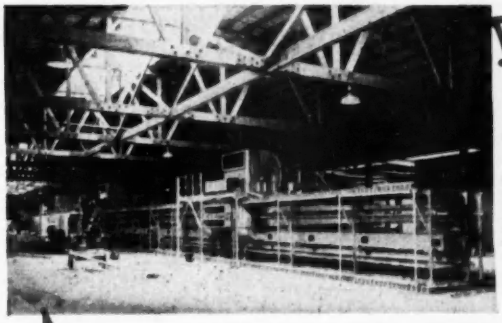
BOOKS . . .

MECHANICS OF MATERIALS, *by Seibert Fairman and Chester S. Cutshall, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. Price, $5.75.* This is a fundamental book for the average student. As such, it purports to present thoroughly, simply, clearly the elements only. The authors omit advanced topics unsuited to an elementary course, and eliminate applications geared toward some specific branch of engineering. Instead, they concentrate on giving the student a sound understanding of the basic principles and thorough training in their use. A large selection of problems—over 700—to be solved by the student are included. Some of these are grouped at the ends of the specific articles on which they are based; the others are grouped at the ends of chapters under the heading, "Supplementary Problems." The latter are often more general in nature or of a higher order of difficulty. A thorough explanation and illustration of the application of the area-moment method in connection with statically determinate and statically indeterminate beams are given. A thorough and systematic treatment of combined stresses with an extensive selection of problems is also found. A treatment of columns designed to give the student a better understanding of the basic theory and its connection to the development of the empirical formulas used in practical design is provided. Numerous illustrative examples, completely solved, to aid the student in learning how to apply principles are included.

THE 1952 AIRCRAFT YEAR BOOK, *published by Lincoln Press, Inc., 511 Eleventh St., N. W., Washington, D. C. Price, $6.00.* Widely acknowledged as a standard reference work on U. S. aviation, this fact-studded book is the official annual of the Aircraft Industries Association. Over 100,000 words of aviation facts include: industry review, detailing the year's product and sales activities of each major aviation company; military aviation for 1952—the procurement picture, significant tactical and strategic developments, combat lessons, and air power history; Government agencies' aviation functions during 1952; the light plane picture with latest design improvements, industrial uses, general market trends, and sales; planes in production, detailed descriptions of 300 U. S. civil and military aircraft, with specifications, performance data, three-view drawings, photos, and history; engines in production, specifications and performance figures, accessory items, installation data on all U. S. engines, reciprocating, turbo and jet; equipment design and production developments; a listing of official aviation records; 1952's day-by-day aviation chronology; and a review of technical progress.

PD

Sometimes It Pays To Do Things Backwards



Drying Oven for Paper Products

Another example of the versatility and engineering ability of Peters-Dalton in meeting problems is illustrated in the installation pictured above. This huge, 200-foot, three heating zone water drying oven was required by a paper manufacturer to dry his molded paper products. Usually, an oven's shell is first erected, then the interior working parts are assembled within it. Due to space limitations, however, the usual method was impossible, so PD engineers worked *backwards* on the job, constructing the oven's interior first, then erecting the shell over the finished oven—meeting the manufacturer's needs for an efficient drying system without sacrificing valuable plant space.

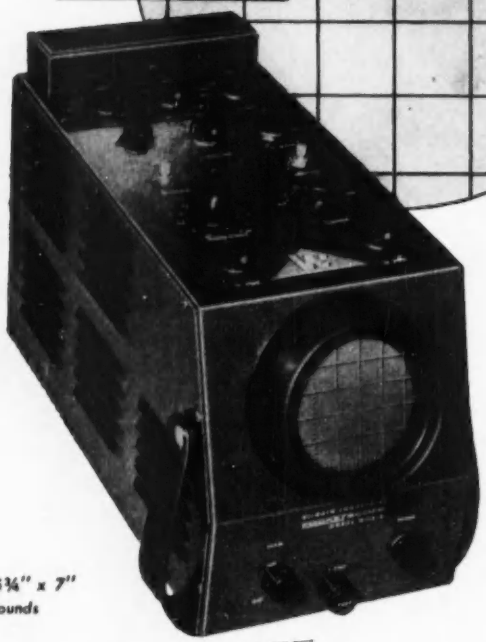
Baking and drying equipment should be designed for the specific product and process. Whatever your baking and drying problems are, PD engineering experience and production "know-how" stand ready to meet and solve them. We will be glad to tell you more if you write, wire or phone.

PD *Hydro-Whirl Paint Spray Booths* PD *Industrial Washing Equipment*
PD *Drying and Baking Ovens* PD *Hydro-Whirl Dust Collecting Systems*

PD Peters-Dalton INC.
17930 Ryan Road • Detroit 12, Michigan

the Waterman

HIGH GAIN INDUSTRIAL POCKETSCOPE®



MODEL S-14-A

Size:
12" x 5¾" x 7"
12¼ Pounds

ANOTHER EXAMPLE OF Waterman PIONEERING...

The HIGH GAIN POCKETSCOPE, model S-14-A, is an outstanding achievement in the field of oscilloscopes. The high vertical and horizontal sensitivities of 10 and 15 millivolts rms/inch respectively; frequency responses within —2 db from DC to 200 KC; non-frequency discriminating attenuators and gain controls; plus individual calibration voltages are but a few of the heretofore unobtainable characteristics of DC coupled oscilloscopes. The sweep is operated in either a repetitive or trigger mode over a range from 0.5 cycles to beyond 50 KC with synchronization polarity optional. All this and portability too! The incredibly small size and light weight of the S-14-A now permits "on-the-spot" use of the oscilloscope in all industrial, medical, and communications fields. Its rugged construction assures "laboratory performance" regardless of environment.

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S-15-A	TWIN TUBE	POCKETSCOPE

Also RAYONIC® Cathode Ray Tubes and Other Associated Equipment

WATERMAN PRODUCTS

Advanced Tooling

(*Continued from page 74*)

along its edges in conformity with the markings indicated on the template. Filing the edges of a typical form block, such as that used to make door ribs for the Boeing C-97 Stratofreighter, required three days. With the new variable tilt shaper, this job can be turned out in only three hours by two men.

Operated by foot control, the rotatable electrode which was designed by Ryan engineers swings from a vertical to a horizontal position to provide additional clearance between the electrode arms of large spotwelding machines. This arrangement facilitates pushing sections of large fuel cells between the 60 in. jaws of the welding machines.

As a result of an improved arrangement of welding booths and their equipment, welding efficiency has increased by 15 per cent over former high standards. Ryan-designed automatic timers are installed to relieve operators of responsibility for controlling the flows of argon gas and water. Remote foot controls are used to allow the welders to regulate welding heat while the work is in progress without the necessity for stopping to adjust the machines. Remote switch controls, for turning the motor-generators on and off, are readily accessible to the operators. The 29 General Electric 150-amp motor-generator sets, which supply welding current, are installed on overhead platforms which are approximately seven ft high. These sets lend themselves to overhead installation because they are compact and relatively light-weight. The noise created by the 7½-hp motors has been substantially reduced. Most important, the turbulent flow of air, generated by the motor, has been entirely removed from the floor area. This turbulence blew the flow of protective argon gas away from the weld area. In order to counteract this effect, welders had to step up the flow of gas, thus wasting quantities of this valuable product.

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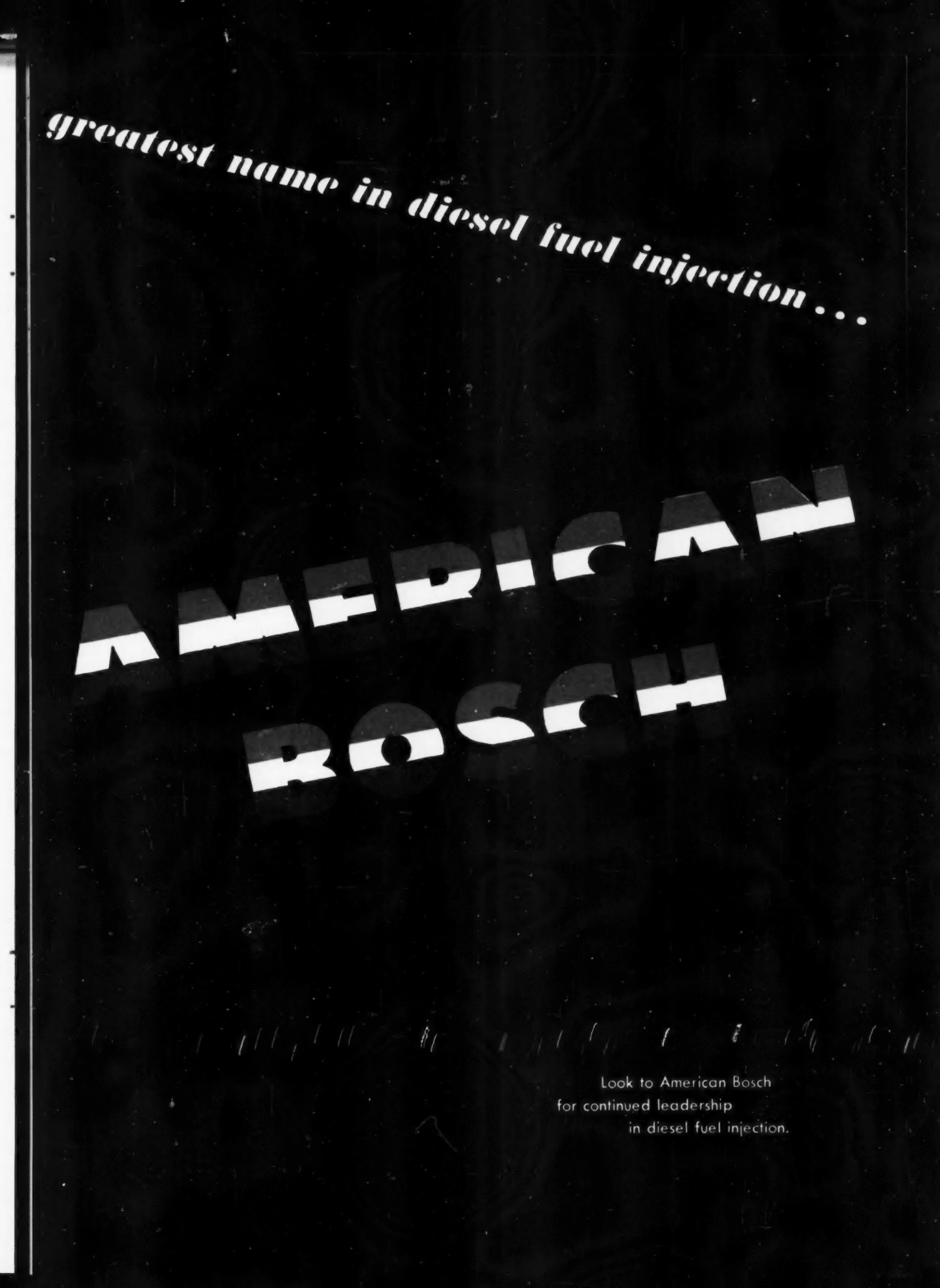
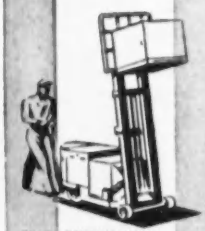

greatest name in diesel fuel injection...
AMERICAN
BOSCH
Look to American Bosch
for continued leadership
in diesel fuel injection.

Hedrich-Blessing Photograph, courtesy of the EDWARD HINES LUMBER CO.

CLARK Electric Fork Trucks

CLARK Attachments



CLARK POWRWORKERS

1903 1953 FIRST FIFTY YEARS CLARK EQUIPMENT

THERE ARE A LOT OF GOOD TRUCKS on the market, and a lot of good arguments for each. But this fact remains: *more people buy CLARK gas powered trucks than any other make.* Since we produce *all* power types . . . gas, electric, diesel and L.P. gas . . . we feel we're in a good position to explain why:

CLARK Horsepower Is Capacity-Rated To Your Requirements —Why pay for excess horsepower that you'll never use? CLARK gives you five engines, rated according to truck capacity. You get plenty of power for the job, without a lot of gas-consuming excess. When you buy a CLARK in the size that's right for you, you get the proper horsepower, too.

CLARK Flexibility Meets Any Work Condition — A wide range of speeds and a constant source of power enables your gas powered CLARK to handle any work condition. Flexibility means 'round-the-clock performance of normal operations, with a built-in reserve of power for peak loads and emergencies. And for long hauls, you can't beat the speed and economy of the gas powered CLARK. . . . . .

No matter what your handling requirements are—there's a CLARK machine to do the job. Electric or gas powered fork trucks, POWRWORKER hand trucks, industrial towing tractors—they all give you quality-value for your money. That's why industry buys more CLARKS than any other make of truck. When you're in the market for materials-handling equipment, talk to your local CLARK dealer first. Most people do!

CLARK ELECTRIC, · GAS, DIESEL, L.P.GAS FORK TRUCKS
AND POWERED HAND TRUCKS · INDUSTRIAL TOWING TRACTORS

INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 68, MICHIGAN

Please send: ☐ Condensed Catalog ☐ Have Representative Call ☐ Driver Training Movie

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Firm Name_____

Street_____

City_____ Zone_____ State_____

AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

SHORTIES

There are now 84 companies and 143 plants making steel in the U. S., compared with 73 and 128, respectively, in 1939.

•

The N. J. Turnpike required an average of about 1600 tons of steel products per mile to build.

•

A method has been developed to roll special steel into strips 125-millionths of an inch thick. The average human hair is about 20 times thicker than such strip.

•

Today there are more airplanes registered in California and Texas alone than existed in the entire U. S. when World War II broke out in Europe.

•

The U. S. aircraft industry has produced more than 480,000 planes during its 50-year history, an average of 26 planes daily.

•

A modern heavy bomber has: enough fuel capacity to drive an auto 16 times around the globe . . . enough anti-icing equipment to heat 120 five-room houses . . . enough wiring for 280 five-room houses . . . enough power to equal that of 400 automobiles.

•

An automatic gage for checking the dimensions of a loaded and assembled round of 90 mm ammunition weighs approximately 10 tons and is believed to be the largest gaging device ever produced for either commercial or munitions production.

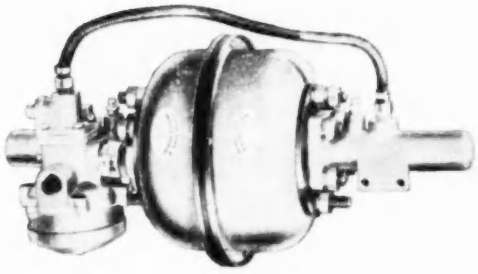
•

If 100 millionths of an inch were represented by the thickness of one dime, one inch would be 400 times as high as the Empire State Building.

•

U. S. plane builders in the first three years of the Korean build-up have produced almost twice the airframe pounds they built during the comparable period of World War II.

...thanks to Borg-Warner POWER BRAKES



BW *engineering makes it work*

BW *production makes it available*

Almost every American benefits every day from the 185 products made by

BORG-WARNER

Just a light touch, an *e-a-s-y* pedal pressure, and Borg-Warner power brakes take hold. Instantly. Smoothly. Firmly. Braking power is stepped up—for quicker, surer, safer stops, with a fraction of the effort. This means more efficient braking—plus greater driver comfort, less strain, less fatigue.

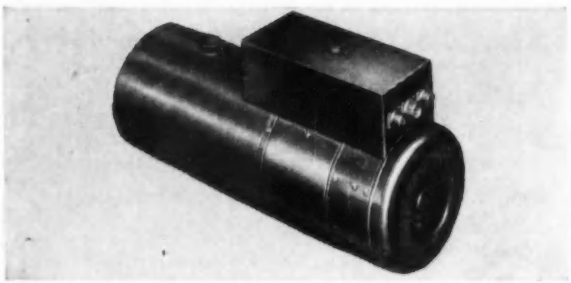
What's more, Borg-Warner power brakes have a minimum of wearing parts, require no lubrication, and are not affected by climatic conditions. That means longer life, lower maintenance costs, greater dependability. Unusually compact, units are easily installed in existing brake systems.

Available for passenger cars, trucks, tractors and trailers, Borg-Warner power brakes are designed, engineered and produced by B-W's Marvel-Schebler Products Division. Another example of how Borg-Warner "designs it better—makes it better." One more way Borg-Warner serves the automotive industry—and the public—every day.

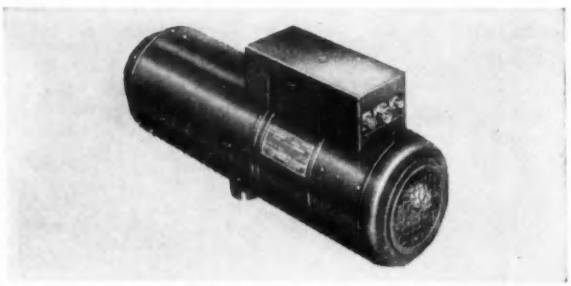
ENGINEERING B-W PRODUCTION

THESE UNITS FORM BORG-WARNER, *Executive Offices, Chicago:* ATKINS SAW • BORG & BECK • BORG-WARNER INTERNATIONAL BORG-WARNER SERVICE PARTS • CALUMET STEEL • CLEVELAND COMMUTATOR • DETROIT GEAR • FRANKLIN STEEL INGERSOLL PRODUCTS • INGERSOLL STEEL • LONG MANUFACTURING • LONG MANUFACTURING CO., LTD. • MARBON MARVEL-SCHEBLER PRODUCTS • MECHANICS UNIVERSAL JOINT • MORSE CHAIN • MORSE CHAIN CO., LTD. • NORGE NORGE HEAT • PESCO PRODUCTS • REFLECTAL • ROCKFORD CLUTCH • SPRING DIVISION • WARNER AUTOMOTIVE PARTS WARNER GEAR • WARNER GEAR CO., LTD. • WOOSTER DIVISION

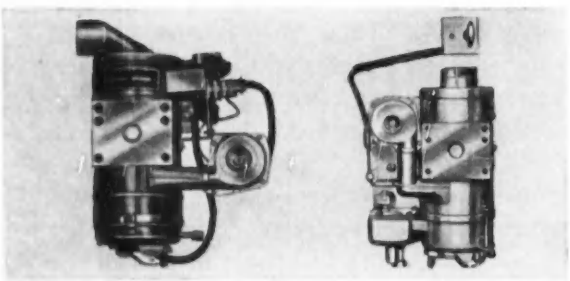
When the chips were down



Model E-511 Coolant Heater for liquid-cooled gasoline and diesel engines. Puts 60,000 B.t.u. per hour into coolant.



Model E-510. Fresh-Air Heater. 60,000 B.t.u. per hour. Delivers more *actual fresh-air heat* than any other unit of this type. Designed for engine, cargo, personnel heating.



Series 460 and Series 590. Coolant and Direct-Fired Engine Heaters. Each heater is a complete package requiring only electric, fuel, coolant and exhaust connections.

Model E-600 Portable Heater. 60,000 B.t.u. fresh-air output. Meets the need for a complete heating unit that is easily portable. Operates on 110 V.

...they called on Perfection

The Armed Forces had to have an absolutely safe and dependable personnel heater for the hard-slugging M-48 and T-43 tanks. They had their pick of the heaters on the market but they *standardized* on Perfection Fresh Air Heaters.

They did this after rigorous tests in Perfection's own 90 below zero Cold Room and in the field *proved* that the Perfection E-500 was the safest, most dependable and efficient heater for the job.

The same practical engineering and production skills that turned out the E-500 . . . the same 11-years of uninterrupted specialization in designing complete winterization kits for all types of vehicles and equipment and heaters for personnel, cargo and engines is available to help you.

If you're building or putting equipment into service for sub-zero or Arctic operation, call in Perfection early on the project! Write for information.

Perfection Stove Company • 7392-D Platt Avenue • Cleveland, Ohio

Here's what we do:

1. Develop the winterization system.
2. Apply it to the vehicle or equipment.
3. Test it to government specifications in our Cold Rooms.
4. Prove that it meets those specifications.
5. Guarantee that the equipment will go at 65 below!
6. Make the drawings for your production, or produce the systems for you.

Perfection

Everything anybody needs for

PERSONNEL
CARGO
ENGINE

heating

Multi-Transformer Welding Presses

By Jack Ogden
Fisher Body Div., General Motors Corp.

Users of resistance welding equipment are finding "Presswelding" to be ideally suited to many of their high-production applications. In its general concept, presswelding may be likened to present-day stamping press practice; however, instead of forming or trimming, the weld-press produces from 16 to 160 spot welds practically simultaneously on a given assembly. The welding press also differs from the usual stampong press in that the ram or movable platen is generally located in the lower part of the machine.

Presswelding has several distinct advantages in high-production applications. Some major advantages of this particular system are as follows:

1. Permits accurate and uniform locations of spot welds.

2. The welding of a large number of assemblies on one high-production fixture rather than on a number of like lower-production fixtures eliminates a particularly vexing problem of fixture coordination.

3. Permits the use of one or a group of presses for a number of different welding operations in the same manner that a stamping press can be used for producing different parts by changing dies.

4. As individual electrodes produce only one or two welds per assembly, their life is increased and production shut-downs for electrode dressing can be virtually eliminated.

5. Lends itself exceedingly well to automatic part handling equipment, particularly in progressive operation setups.

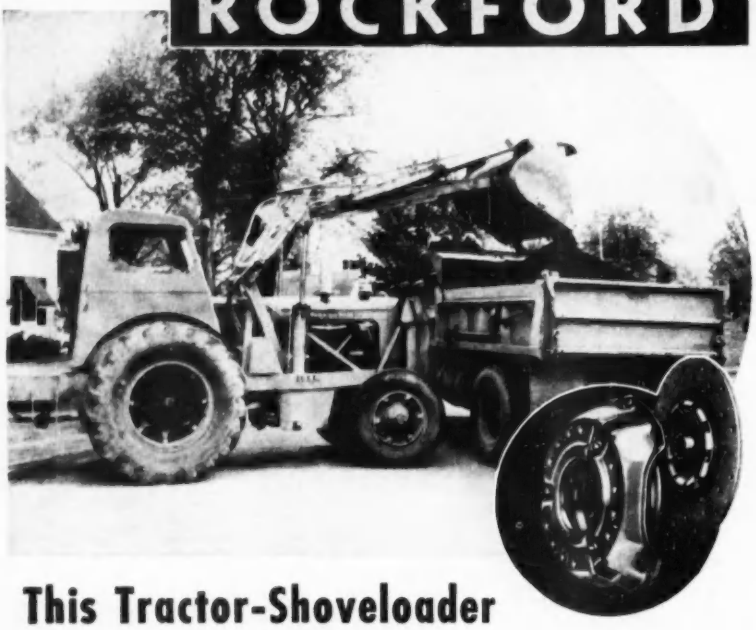
When direct or opposed secondary circuits are used, the presswelding of mild steel in thicknesses up to 0.100 in. is quite practical. Although greater thicknesses may be series welded under ideal conditions, in practice considerable trouble is frequently encountered when thicknesses over 0.050 in. are exceeded on the "hot" electrode side. Although results may be improved by increasing weld spacing, the maintenance of good part fitup becomes a major problem. The stock on the backup electrode side may be two to four times the thickness of the thinner sheet.

When using direct or opposed secondary welding methods, the spacing in a series of welds is usually determined by the electrode holder and pressure cylinder construction. One and one-half inch centers are a common practical minimum. When series welding, the shunt current effect determines the practical minimum spacing.

To avoid excessive current requirements and excessive indentations, series presswelds are usually made with approximately one-half the electrode force recommended by American Welding Society for direct welding. A.W.S. force recommendations are well suited to direct or opposed secondary presswelds. When conditions permit increasing weld time, somewhat lower forces may be used with lower currents.

The above is an abstract of a paper presented by the author before the Southern District Meeting of the American Institute of Electrical Engineers at Louisville, Ky., April 22-24, 1953.

CLUTCHES by ROCKFORD



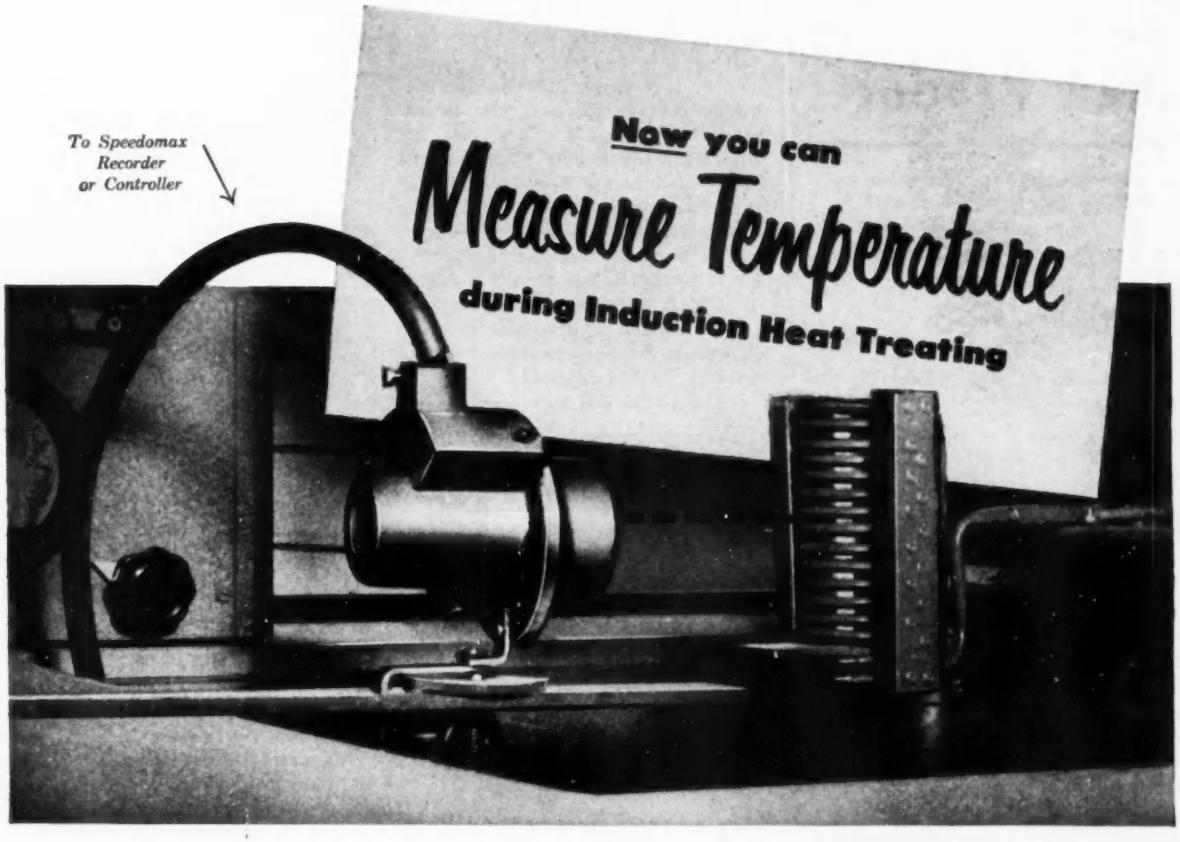
This Tractor-Shoveloader Sure "Dishes Up The Dirt"

MINNEAPOLIS-MOLINE Industrial Wheel Tractors (shown with mounted shoveloader equipment) are built to deliver continuous full engine torque, at any of the 6 forward or 6 reverse speeds. ROCKFORD CLUTCHES help them move heavy road-building materials with ease and precision. Let ROCKFORD clutch engineers help specify the most practical power transmission controls for *your* machines.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

ROCKFORD CLUTCH DIVISION BORG-WARNER
315 Catherine Street, Rockford, Illinois, U.S.A.



In this simplified set-up the Rayotube detector is sighting on steel bar stock between coils of the heating unit. A Speedomax controller connected to the Rayotube automatically regulates and records temperature.

This installation is at Lehigh University where the Dept. of Metallurgy uses a Lepel High Frequency Induction Furnace to investigate the influence of induction heating on the properties of various steels.

With this new Rayotube detector, it is possible for the first time to measure and control temperature of metal parts being heat treated by high frequency induction during their entire cycle.

Mounted only four inches from the induction heating coil, this newest member of the Rayotube family can focus on an opening as small as 0.1 inch between turns of the coil, and through this opening sight on the hot surface of the work. The Rayotube is so fast it reaches 99% of true temperature in 0.6 second . . . is always within 0.15 second of changes in work temperature.

Teamed with a Speedomax instrument it enables you to automatically measure, record and—if desired—control the entire heating cycle directly from the temperature of the work.

If you'd like more details about using Rayotube detectors on high frequency induction heating or similar applications, just write us at 4966 Stenton Avenue, Philadelphia 44, Pa.

SPECIFICATIONS FOR THE SMALL TARGET RAYOTUBE DETECTOR

Catalog Number	8891-C
Response Time	0.15 second to 63% of temperature change; 0.6 second to 99% of temperature change.
Minimum Target Size	0.1 inch at 4 inch focus
Range	1100 F up
Housing Temperature	Can safely withstand 350 F maximum ambient temperature
Optical System	Narrow-angle, double mirror type with visual viewer
Case	Metal, hermetically sealed, including covered leadwire terminal block

LEEDS NORTHRUP
instruments automatic controls • furnaces

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 85)

Hydraulic Jack

Now available is a two-ton hydraulic service jack, Model No. D-7600, that is said to be ruggedly built to withstand severe use.

It is 42½ in. long, has a 45-in. handle, and weighs 135 lb. Its low height is four in. and the raised height 24½ in. It takes just 16 strokes of the handle to lift a capacity load to top height, according to the maker.

A finger-tip, cam-operated release control mechanism allows the operator to stop the load at any position or lower it at any desired speed. The heavy duty unit contains a safty valve to prevent damage from overloading. *Auto Specialties Mfg. Co.*

Circle P-12 on page 65 for more data

You get Special Engineering with...

Lamb Electric

SPECIAL APPLICATION FRACTIONAL HORSEPOWER **MOTORS**

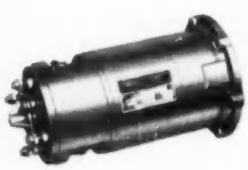
Having inbuilt control switch and receptacle, this motor is readily adaptable to portable tools and equipment.

• Every Lamb Electric Motor is specially designed for the product or device it is to drive. This means that both electrical and mechanical characteristics are engineered for the exact requirements of the particular application, often resulting in savings in space, weight and cost factor.

Special engineering in Lamb Electric Motors assures optimum product performance and efficient, long-life motor operation...another reason why more and more of America's finest products are being powered with Lamb Electric Motors.

The Lamb Electric Company
Kent, Ohio

In Canada: Lamb Electric—Division of Sangamo Company Ltd.—Leaside, Ontario



Where intermittent high torque and space economy are important, this specially developed aircraft motor provides distinct advantages.

Lamb Electric

SPECIAL APPLICATION FRACTIONAL HORSEPOWER **MOTORS**

Electric Impact Wrench

Model 4EW Tork-Hammer has a housing of die-cast aluminum alloy. A pistol grip with detachable side handle, a built-in trigger switch, ball and needle bearings, heavy-duty gears, forced draft ventilation for cool running, and a heavy-duty ac-dc motor of 115 or 230-v current are other features.

The wrench has a net weight of 16¾ lb, a spindle speed of 1800 rpm, and the hammer is mounted on an anti-friction bearing for smoother operation. It handles up to ⅞-in. nuts and bolts. *Mall Tool Co.*

Circle P-13 on page 65 for more data

Safety Valve

Recently announced is an automatic shut-off safety valve that is said to be particularly effective in checking fuel-fed fires.

It is a quick-closing type that is normally held in an open position by an actuating head that operates like a standard sprinkler head. At the specified temperature, the head opens and releases tension on a spring which closes the valve in a fraction of a second. *Valco, Inc.*

Circle P-14 on page 65 for more data

Float Switch

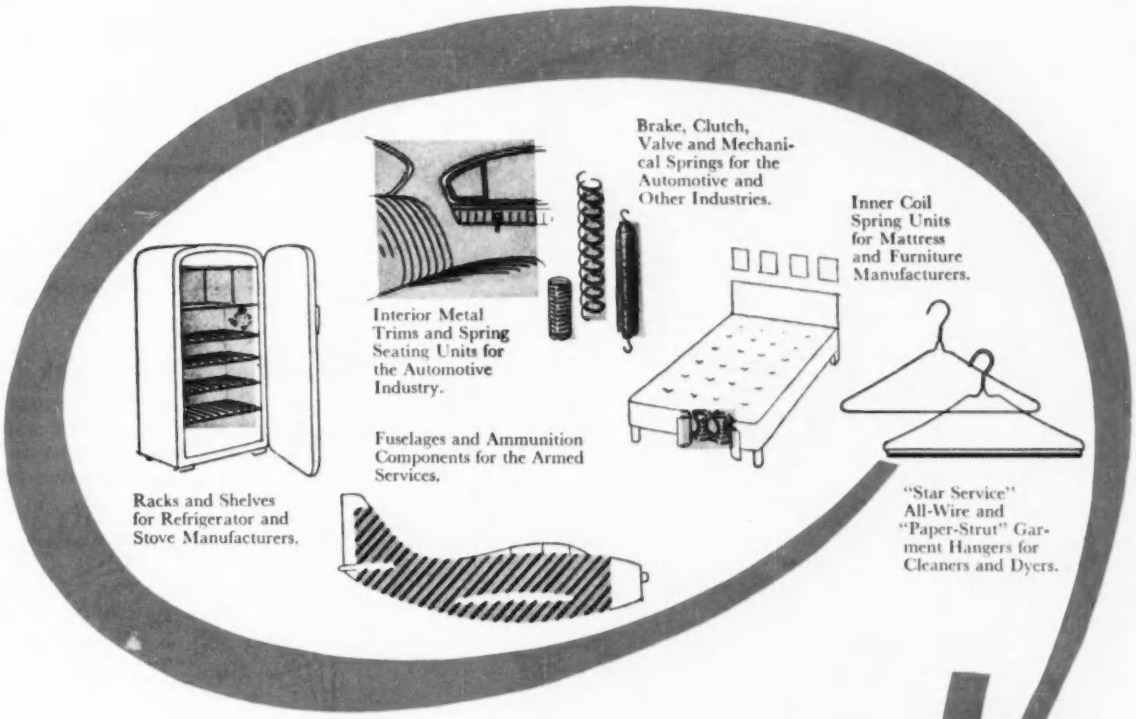
Originally designed as an aircraft high-level fuel control instrument, a float switch is said to be suited for many industrial applications where fluid level control is important.

The instrument is available in different configurations, some of which include relays to handle heavy electrical loads. Others are designed for complete submersion in fluids.

The switches can be supplied with single level or dual level systems. Both types can be provided with levels set at any distance between one and 18 in. from the mounting flange. *Revere Corp. of America.*

Circle P-15 on page 65 for more data

(*Turn to page* 128; *please*)


Brake, Clutch, Valve and Mechanical Springs for the Automotive and Other Industries.
Inner Coil Spring Units for Mattress and Furniture Manufacturers.
Interior Metal Trims and Spring Seating Units for the Automotive Industry.
Fuselages and Ammunition Components for the Armed Services.
Racks and Shelves for Refrigerator and Stove Manufacturers.
"Star Service" All-Wire and "Paper-Strut" Garment Hangers for Cleaners and Dyers.

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GENERAL OFFICES • DETROIT 11, MICHIGAN

IN CANADA: L. A. YOUNG INDUSTRIES, LTD., WINDSOR, ONTARIO

U.S. Patent 2,253,241

Camcar specialists have added the superior quality features of Cold-Flow processing to the assembly-saving design of SPIN-LOCK Screws, to give you high production service with critical tolerance and finish specifications. Ratchet-like structure of teeth is the secret of SPIN-LOCK's tighter grip. Teeth firmly bite into metal to prevent loosening.

You can now obtain the finest quality parts for vibration-proof applications with the same prompt service supplied on all Camcar parts.

Monthly Stock List mailed on Request . . . .

Telephone 5-9451 • *Teletype* RK8653

CAMCAR SCREW & MFG. CORP.

606 Eighteenth Avenue • Rockford, Ill.

THREAD CUTTING
AIRCRAFT SCREWS
PHILLIPS
SEMS
SHEET METAL
SPECIALS

"PRODUCTION-DESIGNED FOR YOUR ASSEMBLY LINE"

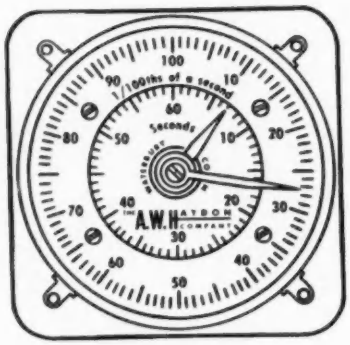
New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 126)

High-Speed Stop Clock

Now available is a hermetically-sealed, high-speed stop clock which totalizes hundredths of a second up to a minute. It is said to weigh only about two lb.



The unit is available with automatic reset and indicator for seconds or other intervals. It is built for operation on 50, 60, or 400-cycles ac, or 20-30 v dc, and 400-c units that have dc clutch. *A. W. Haydon Co.*

Circle P-16 on page 65 for more data

Gas Strainers

Introduction of a line of gasoline strainers has been announced. It is claimed that one type of strainer will now serve all makes of gasoline-powered cars and trucks, whereas formerly 11 types were required to cover the field. *A. C. Spark Plug Div., General Motors Corp.*

Circle P-17 on page 65 for more data

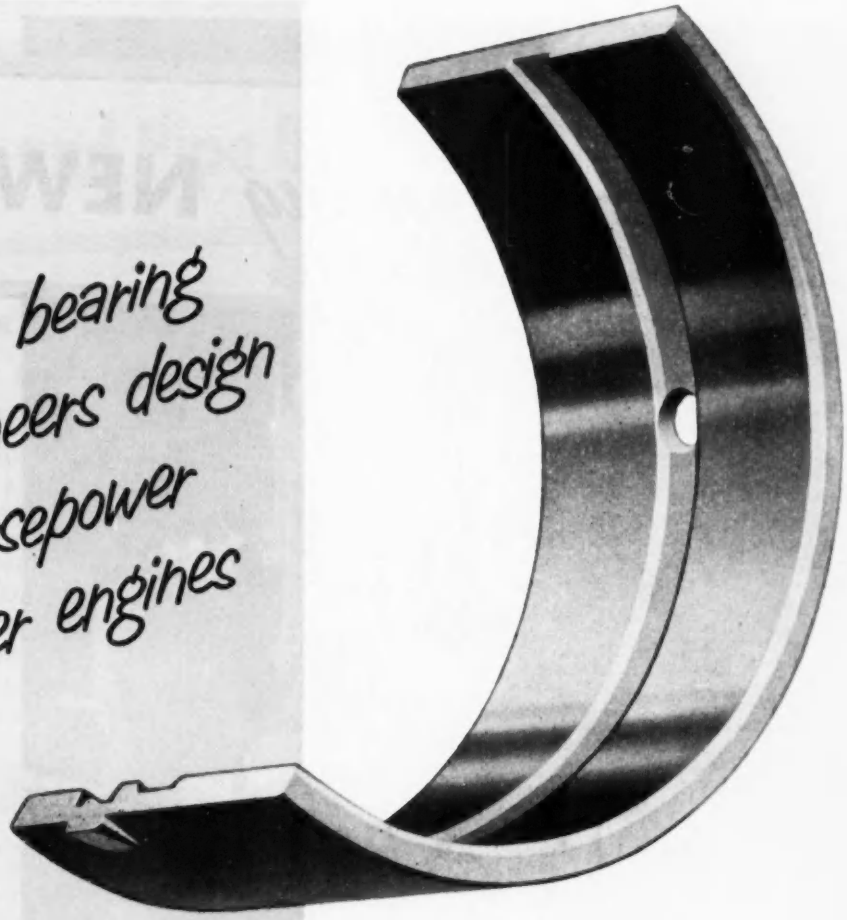
Light Signaler

Ready for distribution is No. 125 Lite-D-Tector and Automatic Reset Circuit Breaker. Installed in the low amperage circuit of a truck, trailer, or bus, the compact unit reportedly automatically signals short circuits and light failures to the driver, and provides independent floodlight protection in emergencies.

It is claimed that the device is

Turn to page 132; *please*)

How this bearing helps engineers design more horsepower into smaller engines



moraine-400

In many experimental labs, Moraine-400 bearings are helping engineers to increase horsepower without increasing engine size. Moraine-400 bearings are proving to be so tough and so durable that *bearing length* is no longer a major limiting factor in engine design.

Consider the experience of one of our customers who is developing an engine that will have greatly increased output *without* greater bulk. Features of this engine include a stiffer crankshaft, larger pistons, more rigid connecting rods and *narrower* bearings—narrower bearings because they are Moraine-400 bearings! Not only is vital space saved but the narrower, tougher Moraine-400 bearings last far longer—*four times as long by actual test.*

If engine development is a part of your responsibility, Moraine-400 bearings can help to solve your design problems.

moraine products

DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

Announcing NEW PINES

Patents Pending

SPECIFICATIONS

CAPACITY

Hydraulic Power — 20 tons.

Tube Size Range — ½" through 2" O.D. Maximum 2" x .083 steel tubing.

Bending Clearance — 2" tube with 5" center-line radius to 180°.

CUSHIONS

Twin double-acting cylinders offset mounted on sides of press, direct connected to heavy, needle bearing crank arms of wing die holders. Three anchor positions compensate for various settings.

DIE HOLDERS

Forward-mounted, equally controlled wing-type with single screw adjustment and die recesses.

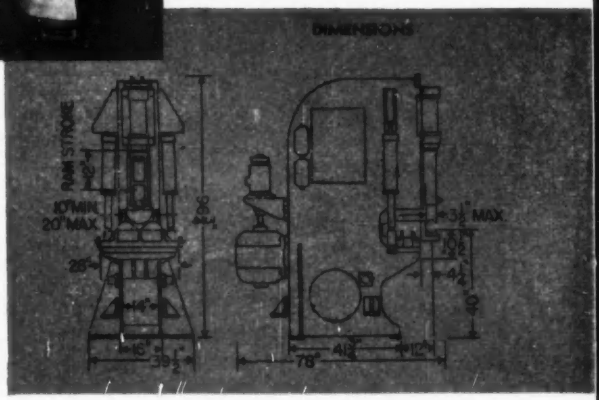
BASE

Welded HR steel frame work, stress relieved. Incorporates oil reservoir, pump, motor, and valve-mounting units.

ELECTRICAL

20 hp, 1200 rpm motor powers 2000 psi Vickers pump. 220-440 volt, 3-phase, 60-cylce. Control circuits on 110 volt through transformer.

New Pines 20-Ton Vertical Hydraulic Tube and Pipe Bending Press showing side-mounted twin oil coolers, panel-mounted hydraulic valves, side offset-mounted cushion, and 10-station automatic angle-of-bend selector turret. Note how design eliminating under die cushion mounting provides extra working clearance. On this setup, adjustable bars at left are used for positioning workpiece for various planes of bends.



PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery | 656 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

20-Ton Tube and Pipe BENDING PRESS

DESIGNED WITH EXTRA WORKING CLEARANCE..... SPEEDS HANDLING BROAD RANGE OF MULTIPLE BENDS IN ONE SETUP

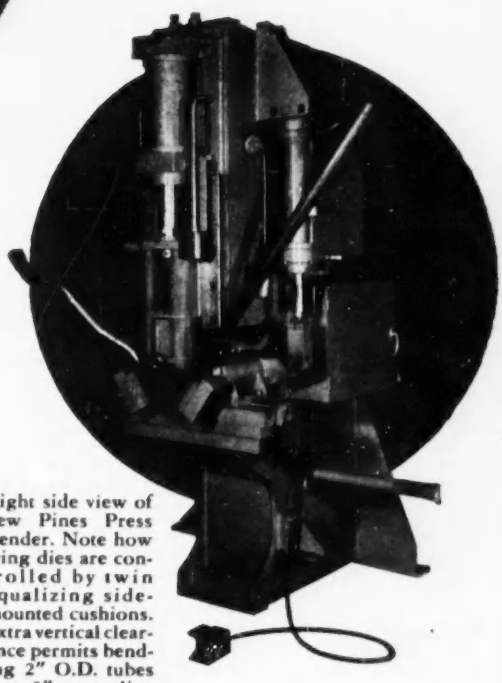
You'll find in the new Pines 20-Ton Hydraulic Press Bender a world of new production features, including those you have been wanting for a long time, that will help you substantially increase output and reduce production costs. You'll find the overall design affords greater working area on both sides and in front of the press and permits handling a much broader range of multiple bends in a single setup.

You'll like the new 10-station automatic angle-of-bend selector that eliminates cycling through idle stations, and the twin double-acting cushion cylinders on each side of the press that positively maintain a constant equalized pressure and help produce smoother, better bends without excessive flattening or distortion. Easy operating and setup features are included that save time and reduce operator fatigue.

These, and the many other outstanding Pines features listed below, will help you step up efficiency as much as 50% in handling, for example, automotive exhaust and tail pipes requiring a variety of bends in different planes, as well as the hundreds of other jobs adaptable to press benders.

OUTSTANDING FEATURES

- **Twin Equalizing Side-Mounted Cushions** — eliminate base obstructions, provide greater working clearance, maintain constant torque, reduce flattening and distortion.
- **Faster Cycling** — 10-station angle-of-bend selector indexes and resets automatically to starting position, eliminates cycling through idle stations, increases output.
- **Greater Work Handling Capacity** — extra clearance reduces number of setups on multiple bending, permits broader use of uniform radii, cuts tooling and production costs.
- **Interchangeable Pick-Off Turret** — for angle-of-bend control. Permits storing and remounting for repetitive jobs, reduces setup time, insures accurate duplication on repeat work.
- **Adjustable Ram Speed Control** — assures efficient operation, simplifies setups. Ram can be lowered slowly or stopped at any point.
- **Built-In Oil Coolers** — maintain uniform oil viscosity, assures uniform results on production runs.
- **Single-Screw Wing Die Adjustment** — eliminates problem of equalizing die settings. Adjusts both die holders simultaneously.
- **Movable Foot Control** — assures maximum convenience, reduces operator fatigue. Master safety switch on ram slide.
- **Sturdy Welded Steel Frame** — stress relieved, assures rigid die support, provides extra working clearance.
- **Compactness Conserves Floor Space** — 100-gal. oil reservoir in base, motor vertically-mounted at rear, panel-mounted valves.

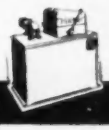


Right side view of new Pines Press Bender. Note how wing dies are controlled by twin equalizing side-mounted cushions. Extra vertical clearance permits bending 2" O.D. tubes on a 5" center-line radius to 180°.

PROMPT DELIVERY — Write today for more data and prices on the new Pines High Production Bending Press. They are being lot-produced as standard units and prompt delivery can be made on early orders. They are designed and built by America's leading manufacturer of tube bending equipment.

Automatic Benders

Semi-Automatic Benders



Tube and Rod End-Finishing Machines

Bench-Type End-Finishing Machines

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 128)

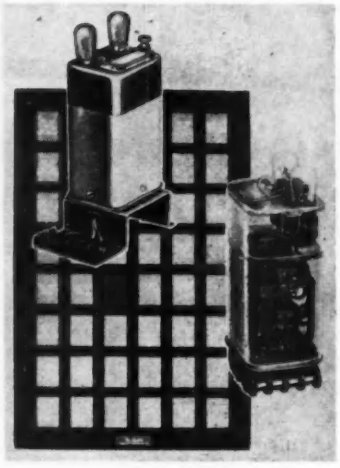
quickly installed in any convenient position on the dash. A turn of the knob adjusts the unit for the power load. After adjustment, the red and amber signal lights automatically warn the driver of shorts and light failures. The use of fuses is eliminated, according to the manufacturer. *E. Edelmann & Co.*

Circle P-18 on page 65 for more data

Relay Plug-In Units

Said to fulfill a wide range of applications for reliable signaling service are enclosed signal relay units recently developed.

These Model LPG relay plug-in units reportedly employ the same relays and all other parts used in hermetically sealed models, but instead are completely enclosed, dust proof, and may readily be taken apart. Greater economy is said to result.



Over 100 standard circuits are available, many with universal features to permit changes in the operating sequences in the field with simple terminal connections. It is claimed that the units can be assembled into any number of multiple stations from a single unit to hundreds in the same system. *Tigerman Engineering Co.*

Circle P-19 on page 65 for more data

Paint Strippers

Recently developed are two paint strippers, Composition Nos. 56 and 57, designed respectively for tank immersion stripping and brush-on stripping of a wide variety of alkaline-resistant paints and lacquers.

The first stripper is a thin-bodied solvent, neutral in character, having a pH of 7. It is non-flammable, and contains no phenols, cresols, acids or alkalies. It is designed for immersion stripping of urea-formaldehyde, alkyd, phenolic and urea-melamine finishes, lacquers, varnishes, wrinkle finishes, and vinylite resins.

The second material is a viscous solvent intended to replace combinations of non-viscous solvent detergents and thickeners when stripping finishes from vertical and inverted surfaces of equipment. *Oakite Products, Inc.*

Circle P-20 on page 65 for more data

Radial Bearings

Recently announced is a new line of precision-ground radial bearings. Designated as the "C" Series, they

(*Turn to page* 136; *please*)

THIS TRUCK IS EQUIPPED WITH

Burton LEAF SPRINGS

Burton has attained its high standing in the motor trucking industry by consistently turning out uniform, maximum performance springs.

That is why Diamond T Motor Car Co., along with other leading manufacturers of heavy-duty transport equipment, uses Burton Springs. Burtons are correctly designed and expertly engineered by qualified technical men of long experience. They are manufactured with modern equipment under careful supervision and to the most exacting standards. Burton springs are dependable.

Place your spring problems in the hands of our engineers. They will answer your questions in minimum time after thorough investigation. Their research can mean greater ultimate profit for you.

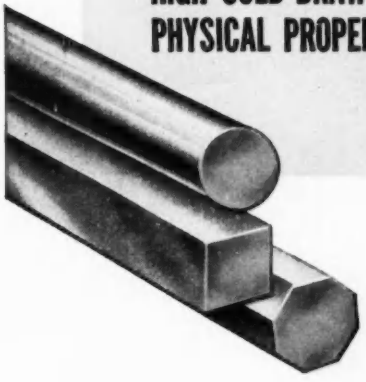
Get in touch with Burton today.

PUT THE BURDEN ON BURT BASCO

Burton AUTO SPRING CORP.
2433 W. 48th Street
Chicago 32, Illinois

Take the inside track to better products

If you need
COLD FINISHED STEEL
that has
GOOD MACHINABILITY
GOOD HEAT-TREATING PROPERTIES
HIGH COLD-DRAWN PHYSICAL PROPERTIES



J&L JALCASE is a sure bet

It's produced by J&L, the *originator* of these grades.

It's available in grades suited to a wide range of applications.

It's supplied as cold-drawn or cold-drawn with metallurgical processing which includes special tempering.

Its typical analyses are found in the AISI 1100 series.

It's backed by J&L steel-making know-how that can help you apply it to your particular applications.

Set the wheels in motion towards determining how you can produce better parts, faster, with Jalcase, the original open hearth free-machining steel. Fill in the coupon to get detailed descriptive information on J&L Jalcase . . . or, better still, contact the J&L representative nearest you today.

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"You can make them better with J&L Jalcase."

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COMPANY _____

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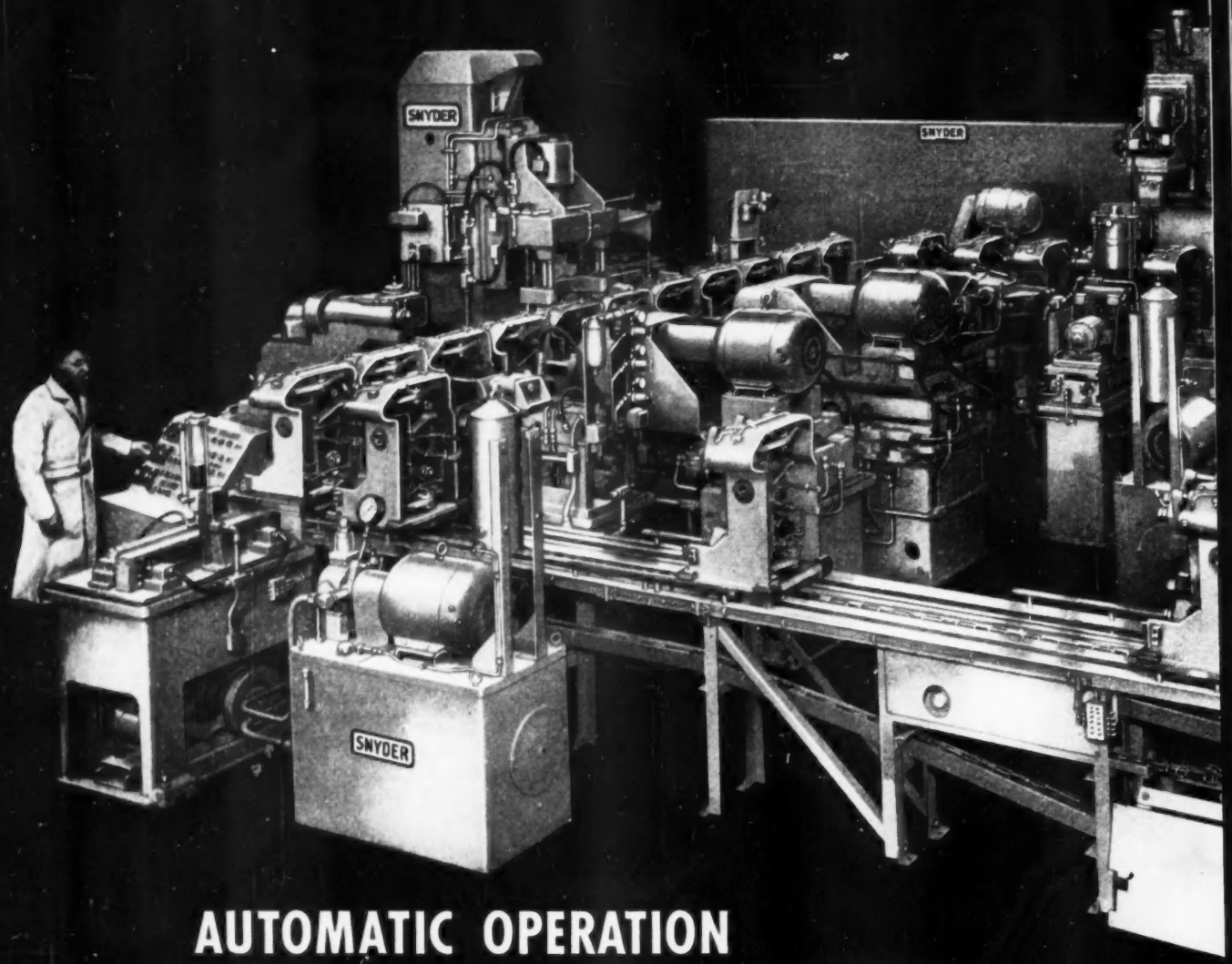
SNYDER MACHINES CONTROL COSTS

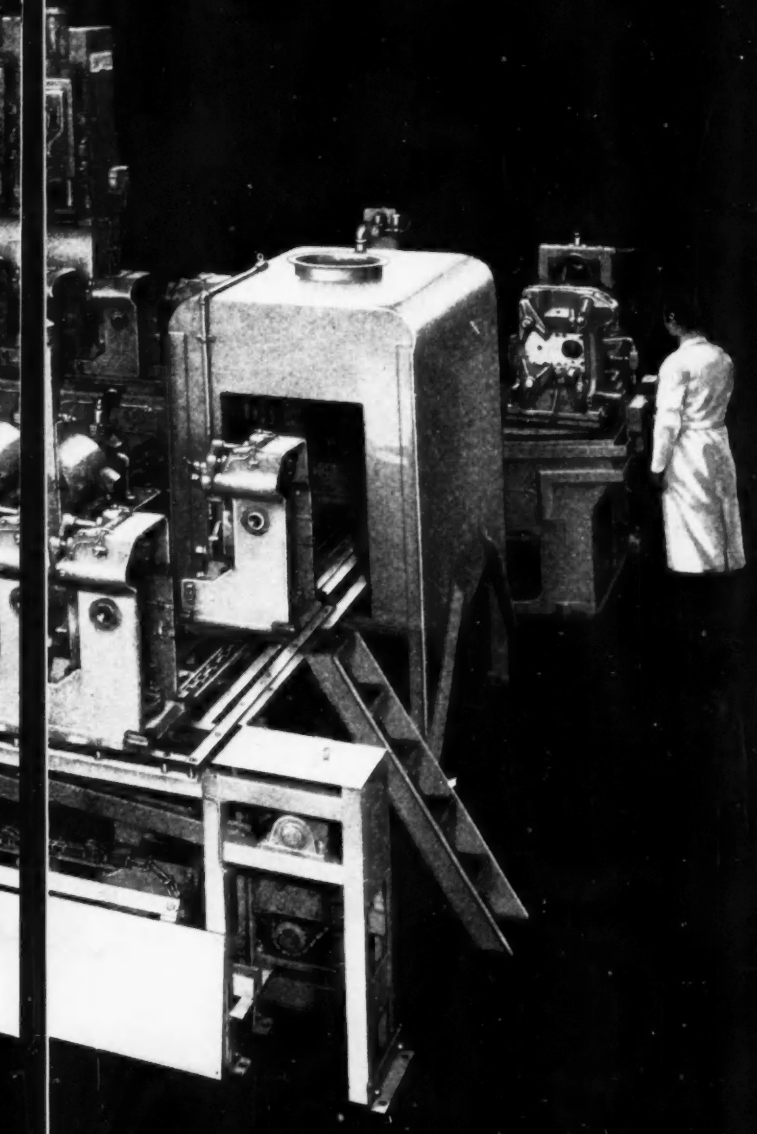


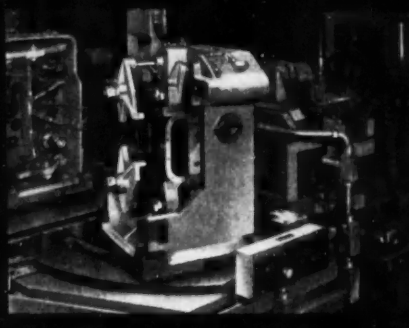
AUTOMATIC OPERATION

MILLS, DRILLS, TAPS, BORES, COUNTERBORES, COUNTERSINKS FRONT COVERS FOR AUTOMOTIVE ENGINES • AUTOMATIC INDEXING, LOCATING, CLAMPING, AND RELEASING • AUTOMATIC TRANSFER THROUGH TWO-STAGE, CONTINUOUS WORK CYCLE • AUTOMATIC CONTROLS • AUTOMATIC SAFETY INTERLOCKING SYSTEM • AUTOMATIC LUBRICATION • AUTOMATIC CLEANING AND CHIP REMOVAL • SKILLED OPERATORS NOT NEEDED

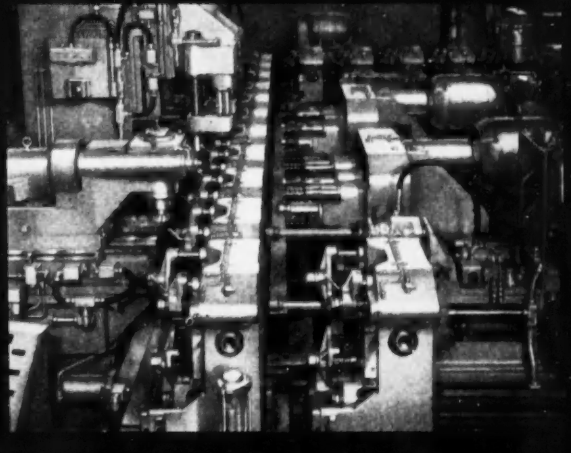
18 STATION AUTOMATIC TRANSFER

180 FRONT COVERS AN HOUR AT 100% EFFICIENCY





At Station 18 the fixture is rotated 90°, air wrenches unclamp the part so that it is easily removed. The fixture returns to Station 18, engages the return conveyor, is automatically blown clean and returned to the loading station.



Fixtures leaving Section 1 (above) move at right angle so that the other faces and top of the part are exposed to tools. The part enters the work cycle with three ground faces, leaves it ready for assembly.

SNYDER

3400
E. LAFAYETTE

TOOL & ENGINEERING COMPANY

DETROIT 7,
MICHIGAN

28 Years of Successful Cooperation with Leading American Industries

YOU CAN BANK ON IT!

FOSTORIA

Ovens give the

FINEST FINISH BAKE

Plus—

Important SAVINGS in Time Space and Cost

Proved in over 7,000 installations

UNEQUALLED QUALITY ADVANTAGES

SMOOTH "FLOW-OUT" OF PAINT

Uniformity of heat distribution and rapidity of solvent removal give smooth, even paint film.

THOROUGH UNIFORM BAKE

Near Infra-red energy penetrates paint film with constant uniform temperature.

CLEAN FINISH

No by-product of combustion — no condensation of solvent volatiles to mar finish.

SAFETY CONTROLLED

Instant heat shut-off with conveyor stoppage. No over-baking by shut-off lag.

STABLE PERFORMANCE

Unaffected by day-to-day weather conditions.

UNEQUALLED LOW COST ADVANTAGES

LOWEST OPERATING COST

Puts heat into the product — not into oven walls. Uses less fuel. Gold plated interior reduces heat loss to 2%. In many instances, Fostoria electric operation actually costs less than any other fuel.

REQUIRES LESS FLOOR SPACE

Shorter Cycles—most production for oven size. May be ceiling mounted.

FASTEST PRODUCTION

Fastest means of heat transfer. No warm-up required — no shut-off lag. Heat levels instantly changeable.

LOWEST MAINTENANCE COST

Clean operation — no combustion by-products. Lowest source replacement cost.

COMFORTABLE WORK CONDITIONS

No room ventilation problems.

COMPETITIVE INITIAL COST

Comparable to any quality-built oven.

Throughout industry, new high standards of efficiency are being set by utilization of modern Fostoria oven equipment. A Fostoria representative will gladly analyze your production needs and submit recommendations for your consideration.

INFRA-RED fostoria OVENS

THE FOSTORIA PRESSED STEEL CORP.
FOSTORIA, OHIO, Dept. I

Please send me information on Infra-red Ovens for .....

Name .....

Company .....

Street .....

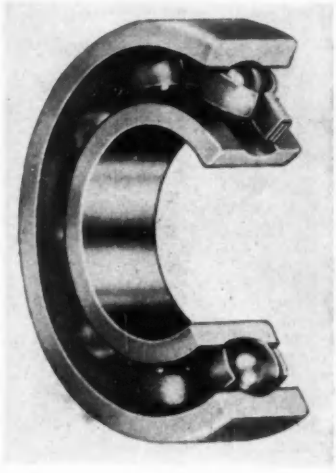
City ..... State .....

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 132)

are of the solid race type with ball retainers and are made in inch dimensions which correspond to established light duty inch standard sizes.



The bearings are said to be designed for light-duty radial, thrust or combined load applications and speeds in the neighborhood of 5000 rpm maximum. They are produced with ground and polished race ways and incorporate chrome alloy balls. The units are available without shields, single-shielded, or double-shielded. *Nice Ball Bearing Co.*

Circle P-21 on page 65 for more data

Oil-Firing Spark Plug

Now available is a spark plug that is said to be scientifically engineered to fire in engines which shoot oil and foul normal plugs. Features include a specially designed restricted firing chamber and baffle which reportedly recesses the electrodes and prevents the liquid oil from reaching the spark gap and insulator.

A ground electrode made of nickel is welded within the shell and produces a special gap shape which facilitates firing through and around oil. The gap is preset at the factory. *Leonard Spark Plug Co., Inc.*

Circle P-22 on page 65 for more data

(*Turn to page* 138; *please*)

We've put a new roof over an old part of our business

▶ Now—with new, expanded facilities—we can offer you immediate help with your unusual metalworking problems, big or small

THOUGH we've been designing and building standard and special machine tools and tooling since 1898, limited production facilities for special machines have prevented us from offering these services on a wide scale.

But now, our Special Machinery Division has new and greatly expanded facilities. Its exclusive job will be to build special machine tools and tooling or to specially adapt standard equipment to solve specific metalworking problems.

Check our qualifications:

EXPERIENCE: We've been in the business 55 years. In addition to being one of the country's leading producers of standard milling machines . . . *our annual production of special machinery has ranged up to $3,000,000.*

FACILITIES: The new Special Machinery Division plant, built on a 38-acre site, is equipped with more than *$2,500,000 worth of new tools and equipment.*

PERSONNEL: The Special Machinery Division engineering section has nearly 100 experienced design and production engineers at its command. These men specialize in applying the latest developments in mechanics, hydraulics, electronics, metallurgy and allied fields to metalworking. In addition, it has a full complement of experienced machinists and mechanics needed for special machine construction.

PERFORMANCE: Kearney & Trecker's Special Machinery Division is best recommended by its record of successfully solving hundreds of unusual machining problems. These solutions required provision of high productive capacity as well as exacting dimensional accuracies and surface finishes.

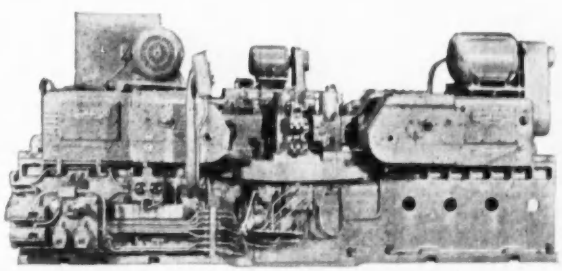
RESPONSIBILITY: Our Special Machinery Division is an integral part of the Kearney & Trecker Corporation . . . and is fully supported by all its financial, physical and personnel resources.

Any commitment for a product of this Division is a commitment that fully involves the accepted reputation for responsibility and satisfaction that is Kearney & Trecker's.

We invite your inquiry

We'll be glad to provide you with any information we can . . . including sample machine specification sheets on typical installations, a brochure covering the expanded facilities of our Special Machinery Division, and details on our Customer Engineering Service. Furthermore, if you have special production machinery problems, have one of our senior Project Engineers analyze them, without obligation, of course.

Write, wire or phone the Special Machinery Division, Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.



We've built special machines or adaptations of standard equipment for practically every industry. Here is a photo of a four-station rotary indexing machine we designed and built for a major automotive manufacturer.

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 136)

Oil Reclaimers

Now on the market are Hilco Hyflow oil reclaimers for the purification and maintenance of transformer insulating oils, vacuum pump lubricating and sealing oils, lubricating oils being used in Diesel and gasoline engines, and many other types of industrial oils.

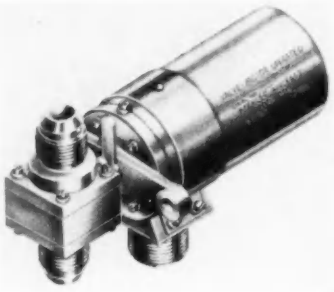
The primary function of the reclaimer is to maintain lubricating or industrial oils in clean condition by continuous removal of contaminants which impair operation efficiency. Units are available in capacities up to 500 gph, filters only for combination with vaporizers, or the vaporizers separately. *The Hilliard Corp.*

Circle P-23 on page 65 for more data

JOHNSON
Tappets
"fill the exacting requirements of today's engines"

Higher horsepower and higher compression put heavier loads on the tappets. Johnson quality assures you the performance you want from these vital engine parts.

"Tappets are our business"
JOHNSON Jp PRODUCTS INC.
MUSKEGON, MICHIGAN



Shut-Off Valve

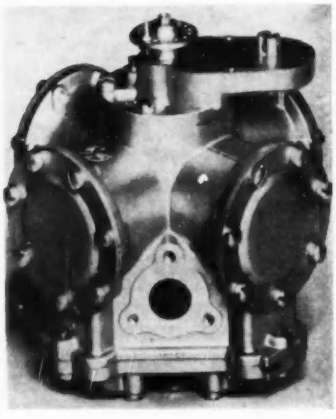
Recently announced is a 15-oz, motor-operated shut-off valve. Although designed for aircraft and guided missiles, for use in fuel, hydraulic, and pneumatic systems, it is said to have many possible industrial applications also.

It is claimed that the valves can be used with aromatic and non-aromatic fuels, hydrocarbon and synthetic lubricants, hydraulic fluids and gases at pressure to 500 psi, with a temperature range of — 65 F to 500 F (ambient temperature range — 65 F to + 225 F). Teflon seals in the new valve reportedly require no curing date decals.

Normal duty cycle of valve is one sec on, to 19 sec off. A manual override opens and closes valve without electrical currents. *Koehler Aircraft Products Co., Inc.*

Circle P-24 on page 65 for more data

Gas Dispensing Meter For Service Stations



Now in production is a self-purging gasoline dispensing meter for service station pumps. Known as Model PM-2, it has reportedly been designed with valve and outlet in the bottom

(*Turn to page* 140; *please*)

TEAM SERVICE by U·S·Steel Supply is up-to-date!

WAREHOUSE SUPT.

TELEPHONE SALESMAN

INVENTORY ANALYST

SALESMAN

DISTRICT MANAGER

RECEPTIONIST

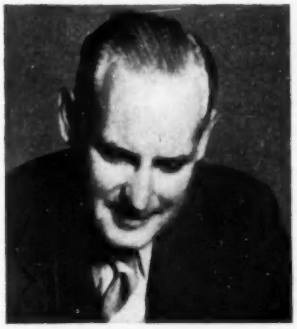
OFFICE MANAGER

CREDIT MANAGER

TRAFFIC MANAGER

WAREHOUSEMAN

ASS'T. DIST. MANAGER


PRODUCT SPECIALIST

He specializes in solving *your* technical troubles!

• Our product specialist can give you expert advice on the selection of steel for a particular purpose, and on the choice of tools, equipment and machinery that can frequently speed up your production. He can interpret and develop specifications to fit your needs, and can advise on the methods of handling various kinds of steel and steel products during your production operations.

When you need technical advice from a product specialist, contact your U. S. Steel Supply salesman. He will put the right man to work for you.

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DIVISION

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UNITED STATES STEEL

Do you have production, purchasing, stocking or delivery problems on threaded fasteners? Pheoll . . . the COMPLETE source . . . has all the answers! And here they are:

STOCKS Pheoll has 'em . . . largest in the industry . . . kept up to level by perpetual inventory controls!

TYPES AND STYLES Pheoll has 'em . . . the industry's *most complete line* . . . by types, head styles, finishes and sizes!

DATE OF DELIVERY Pheoll can generally ship *immediately* on most standard types and sizes!

STOCK INFORMATION Always available for immediate reply to phone calls, telegrams or letters!

QUALITY Tops for 50 years . . . kept that way by constant production line and laboratory inspection!

ORDER HANDLING Yes! Efficient mechanized order-handling procedures minimize errors and hustle orders along to fast, sure completion!

In every way, *you get better service at Pheoll!* That means less work for you . . . fewer orders, reduced paper work, less follow-up, simplified stocking. Test Pheoll on your next threaded fastener requirement and see how headaches vanish!

PHEOLL MANUFACTURING COMPANY
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SCREWS
BOLTS
NUTS

MANUFACTURERS OF:
Machine Screws — Socket Screws — Sems-Wood Screws — Machine Screw Nuts
Drive Screws — Tapping (Sheet Metal) Screws — Thumb Screws — Stove Bolt Nuts
Cap Screws — Threaded Rods — Stove Bolts — Slotted Nuts
Set Screws — Store, Chair and Ladder Rods — Carriage Bolts — Castellated Nuts
Phillips Recessed — Log Bolts — Wing Nuts
Round Screws — Machine Bolts — Cap Nuts
Brass Washers — and other fasteners

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 138)

that prevent water, grit, or sediment from being trapped.

Other features of the one-in., piston-type meter are as follows: aluminum case; cylinders with stainless steel liners; valve and valve seat of corrosion-resistant metals; and external adjustment to change crank throw for positive and accurate calibration. *Meter Div., A. O. Smith Corp.*

Circle P-25 on page 65 for more data

Industrial Fluoroscope

Recently introduced is an industrial fluoroscope, known as the Scopemaster, for the mass inspection of light alloy castings and plastic products.

Of particular interest is the mechanism provided for moving the product in the X-ray beam on a special turntable. A single external control handle permits moving of parts to be inspected in any lengthwise or crosswise direction. In the case of castings, this facilitates inspection of fillets and corners.

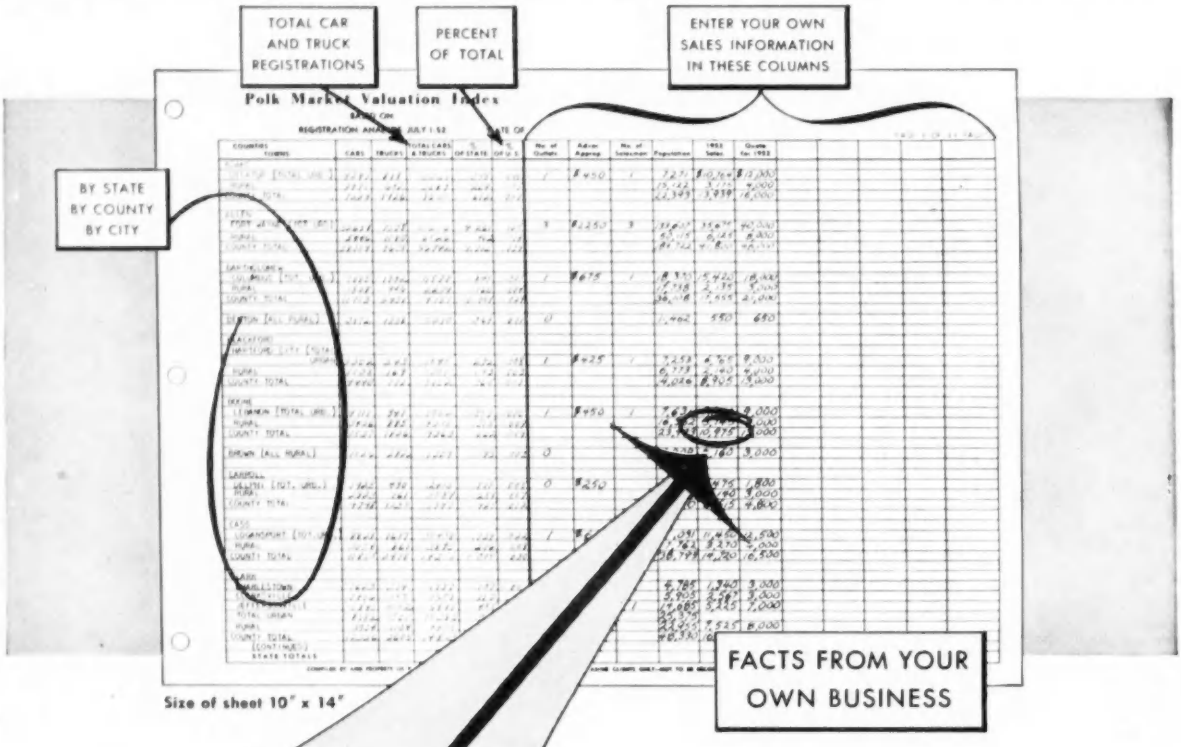
The unit operates from a 110-v, 60-c source. It has a good-size front opening through which products are inserted for viewing. Internal cavities .040 in. in size, or approximately six per cent of the metal thickness in an aluminum alloy casting, can be detected. *General Electric Co.*

Circle P-26 on page 65 for more data

(*Turn to page* 143; *please*)

McLouth
STAINLESS
Steel
For the product you make
today and the product you
plan for tomorrow.
McLouth Steel Corporation
DETROIT, MICHIGAN
Manufacturers of Stainless and Carbon Steels

POLK MARKET VALUATION INDEX


TOTAL CAR AND TRUCK REGISTRATIONS
PERCENT OF TOTAL
ENTER YOUR OWN SALES INFORMATION IN THESE COLUMNS
BY STATE BY COUNTY BY CITY
Polk Market Valuation Index
FACTS FROM YOUR OWN BUSINESS
Size of sheet 10" x 14"

WHAT WERE YOUR SALES FOR '52 IN BOONE COUNTY, INDIANA ?

Know at a glance how YOUR sales in Boone County — or any other county or city — compare with official car and truck registrations. Here on convenient sales control forms is a new major weapon for sales managers — a means of recording graphically your entire sales picture — and actual performance records. Set quotas . . . determine potentials . . . establish advertising appropriations on the basis of car and truck population county by county, and city by city. Write, wire or 'phone for details on how this new Polk service can be applied to your sales picture.

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- MAILING LISTS
- CONTEST MANAGEMENT

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 140)

Battery Tester

Now on the market is a portable test instrument for measuring electrically the state of charge in lead-acid type storage batteries.

It is also said to check the voltage regulator on automotive vehicles.

The unit is only 5½ in. in diameter and one in. thick. It has a three-color dial and coiled retractable test leads.

The back of the instrument has a hook for hanging it on the vehicle and a switch to change from six-v to 12-v test position. The dial face has three separate scales: open circuit battery voltage, battery load cell test, and voltage regulator test.

The meter utilizes a suppressed zero so that the open circuit voltage scale reads from 1.60 v to 2.60 v over the whole scale arc. The voltage regulator scale reads from 6.0 to 9.5 and from 12.0 to 19.0. *Auto-Test, Inc.*

Circle P-27 on page 65 for more data

Compression Gage Kit

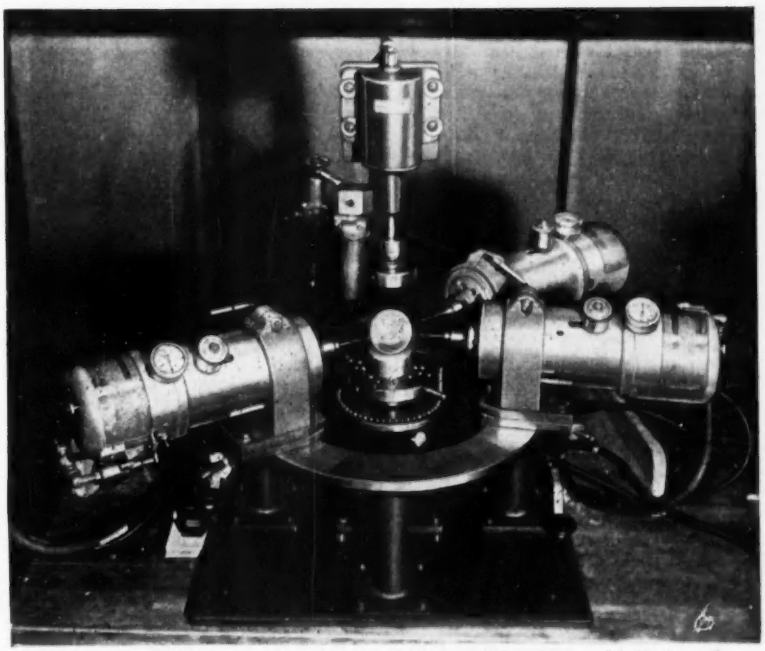
Model G-43 master compression gage kit is a precision tester for testing individual cylinder compression of car, truck, tractor, and aviation engines. Calibrated 0-200 lb, the gage is said to retain pressure readings until the pressure release valve is depressed.

Four adaptors are included for reaching deeply recessed spark plug ports. *King Electric Equipment Co.*

Circle P-28 on page 65 for more data

(*Turn to page* 146; *please*)

DUMORE® DRILL HEADS increase production 322% for toy manufacturer



The 3 Dumore Drill Heads are mounted on a special fixture which positions and holds the work . . . automatically indexes the workpiece on a timed cycle. The company reports, "Our study has discovered no competitive or comparable machine for the speedy drilling of holes in plastic."

. . . save $13.74 per thousand plastic balls drilled

A METHODS study revealed that three Dumore Automatic Drill Heads mounted on a special fixture cut this manufacturer's production cost from $18.00 to $4.26 per thousand balls drilled.

Based on yearly output of 500,000 balls, this meant savings more than four times the original $1,600 cost of the Drill Heads and fixture. What's more, this company found that the Dumores' flexibility also helped make substantial reductions in necessary shelf inventory.

As a company spokesman put it, "Low initial cost plus flexibility and ease of operation make the DUMORE a 'natural' for multiple drilling operations."

In most cases, if you're drilling small holes in wood, plastic or metal, you, too, can cut production costs. For details, see your Industrial Distributor or write:

Builders of precision fractional hp motors, hand grinders, tool post grinders, drill grinders, flexible shaft tools, quills and automatic drill heads.

THE DUMORE COMPANY

1339 Seventeenth Street • Racine, Wisconsin

News About Created-Metals

Cuts Inventory 50% with Standard Tools

A leading appliance concern recently reported: . . . "As a result of suggesting to the responsible Process Engineering group standard tools which would perform the same service at an initial purchase saving, as well as a substantial saving in procurement time, our inventories of so-called special cutting tools have been reduced by more than 50%."

News about the new Carboloy MTI Plan indicates that it is designed to work similar benefits for cutting-tool users.

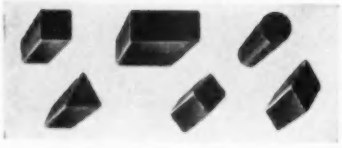
Details can be had by writing the Carboloy organization (address at right).

* * *

Complete Line of Insert Blanks

With the addition of two new diamond-shaped styles, the Carboloy line of carbide blanks for insert tools is now complete.

Available in 12 sizes, the styles



are square, rectangular, round, triangular, 55° diamond and 80° diamond. Blanks are available from Carboloy stocks or from Authorized Distributors.

* * *

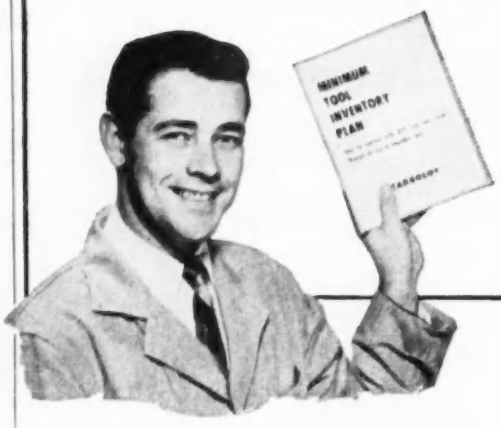
New, Free Magnet Idea Kit for Shops

A handy, new literature kit showing the how's and why's of permanent magnets is currently sparking shop men to real savings in time and money.

The magnets have proved very effective as sheet steel separators, magnetic stands, tool-holding devices, sweepers' "pickup" tools and tool retrievers, to name a few uses.

Kit can be obtained free from Carboloy Department of General Electric Company. (See address at right.)

YOUR CARBOLOY FIELD REPRESENTATIVE SAYS . . .



"This reduces

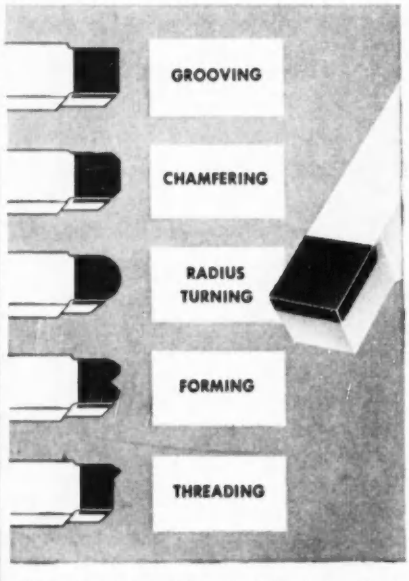
"It's an astoundingly simple, practical way for you to benefit from the low cost, wide adaptability and quick availability of Standard Carboloy Tools.

"Briefly, here's how the Minimum Tool Inventory Plan works: Instead of loading your shelves with special, made-to-print single-point carbide tools, you stock a lesser number of Carboloy 'Standards' . . . always available from distributors' stocks nearby. The MTI Plan shows you how to convert these Standards, *in minutes,* to handle about 80% of your special jobs.

"Your operating efficiency stays at par or improves. Your inventory goes down – about 30% or more. You cut out tooling delays, save on initial tool investment and tool cost. You streamline your inventory procedures, reduce tool waste . . . get many other benefits shop-wide.

"Send coupon for MTI Plan Kit."

1 ADAPTABLE for up to 80% of your single-point tool jobs



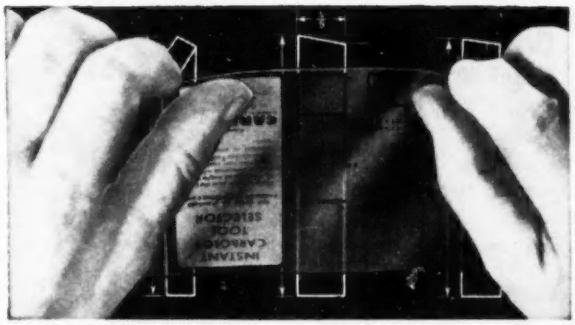
Above is a Style C Standard Carboloy Tool. It can be used "as is" for some jobs, or ground quickly to many special shapes. Five typical ways it can be adapted are shown.

There are only 11 styles of Standard Carboloy Tools . . . ready to be used "as is" for general turning, facing and boring . . . or quickly ground on regular carbide grinding equipment to fit those tricky special jobs. With Standards, you need *fewer* tools to do *more* jobs. Thus, you operate on lower inventories.

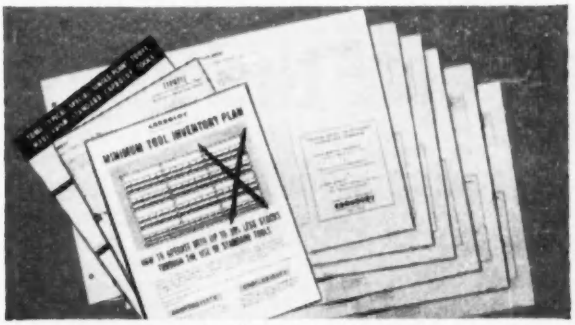
2 AVAILABLE always from nearby Carboloy distributors

You can get off-the-shelf delivery on Carboloy Standards in 98 cities from coast to coast. No waits. No production delays as with special, made-to-print carbide tools. Knowing you can get such speedy delivery of Carboloy Standards means you can cut your inventories still more.

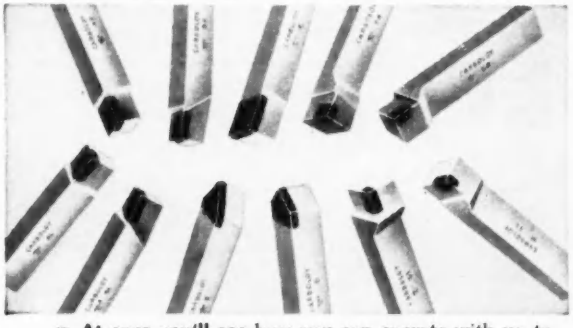
new Carboloy MTI Plan
your tool stocks up to 30%"



3 **Free MTI Plan Kit** includes two handy tool selectors. You place them over your special prints, find out quickly which Carboloy Standard best adapts to each job. Selectors are of transparent plastic.



4 **Kit also includes** Plan Sheets in which to tabulate your Standard Tool selections, and easy-to-follow Grinder Sheet which outlines simple way to convert the Standards to your job specifications.



5 **At once you'll see** how you can operate with up to 30% fewer tool stocks. Next step is to phone your nearby Carboloy Distributor for swift delivery on *only* the Standard Carboloy Tools you need.

6 **Should you have** the slightest difficulty getting the plan rolling, a Carboloy sales representative will call at your plant, help you smooth out the kinks. His expert services won't cost you a penny.

SEND COUPON TODAY—PINNED TO YOUR COMPANY LETTERHEAD—
FOR YOUR FREE MTI PLAN KIT

CARBOLOY TOOLS ARE STOCKED COAST TO COAST BY

AUTHORIZED CARBOLOY CEMENTED CARBIDE DISTRIBUTORS

Look under "Tools" in the Yellow Pages of your local telephone book or in Thomas' Register for your nearby Carboloy Distributor. He has complete local stocks and services. Ask him about the MTI Plan.

"Carboloy" is the registered trademark for the products of the Carboloy Department of General Electric Company.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11151 E. 8 Mile Ave., Detroit 32, Michigan

☐ Please rush me, at no cost or obligation, your MTI Plan Kit.
☐ Have your sales representative call, without obligation.

Name _____ Position _____
Company _____
Address _____
City _____ Zone ____ State _____

New Products

For additional information please use postage-free reply card on page 65

(*Continued from page* 143)

Torque Wrench

Known as the Hi-Lo Torq, a many-purpose torque wrench has been announced. It is said to be the first ordinary wrench with precision torque built in.

The torque mechanism is set to the torque desired in micrometer-fashion. When that torque is reached in operation, the tool automatically releases in a very small arc.

The wrench is available in 12 different models. Six of these are reversible ratchet head types with either ¾ in. or ½ in. square-drive, while the other six are plain square-drive. A torque of from 10 to 400 ft-lb or from 100 to 4800 in.-lb is said to be obtainable. *Richmont, Inc.*

Circle P-29 on page 65 for more data

Car Spotlight

Recently announced is a spotlight that is installed merely by placing it on the windshield. It then adheres instantly by means of a suction fitting.

The light reportedly can be swung around for lighting road signs, house numbers, etc. It plugs into the dashboard, and by means of an extension cord can be used as a trouble light at any part of the car or on the road. *Columbia Motor Co.*

Circle P-30 on page 65 for more data

now there are 10

leading manufacturers of autos, trucks and tractors who

control with DOLE

Each year more of the biggest names in the American Automobile Industry are switching to Dole Thermostats for more accurate control of cooling systems. Dole Thermostats are specially engineered for modern high compression engines and pressure cooling systems. Specify Dole with confidence and help assure a smooth running motor.

Control with Dole

DOLE

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Protect Your Good Name with Another

BOOKS . . .

READINGS IN BUSINESS CYCLES AND NATIONAL INCOME, *edited by Alvin H. Hansen and Richard V. Clemence, published by W. W. Norton & Co., 101 Fifth Ave., New York, N. Y. Price, $5.25.* This collection of readings represents many economic points of view, both with respect to policy and theory. The volume is divided into seven parts as follows: historical episodes; business-cycle theories; economic dynamics; econometrics; international and interregional aspects; long cycles; and cycle policy. The writings of such noted economists as C. N. Ward-Perkins, W. W. Rostow, J. S. Mill, Gustav Cassel, A. D. Knox, L. A. Metzler, J. M. Keynes, D. R. Vining, Walter Isard, and S. H. Slichter are among those included.

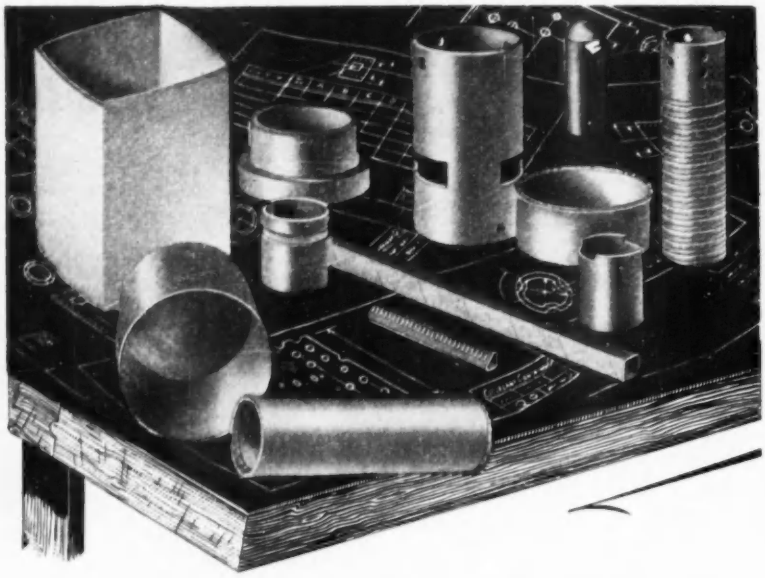
SOCIAL RESPONSIBILITIES OF THE BUSINESSMAN, *by Howard R. Bowen, published by Harper & Bros., 49 East 33rd St., New York 16, N. Y. Price, $3.50.* Third in the important series on the Ethics and Economics of Society, being published in cooperation with a study committee of the National Council of Churches, this book explores the social role of the businessman in a free enterprise economy. The first basic question here posed is: What responsibilities to society would the American man of business reasonably be expected to assume? From this point of departure, the author discusses the tangible benefits that might result from general acceptance of such responsibilities by the business world; he suggests practical steps toward the recognition of broader social goals in business decisions, and analyzes a number of plans now being discussed or in operation to increase the effective social responsibility of business executives. In a concluding section, a review of the ethical implications of the book in relation to the Christian viewpoint is given.

They're pouring futures in the foundry !

When man first cast molten metal, he poured himself a future. He started something that has become more and more important – a process our great industries could not do without. The results are everywhere. You'll find castings used again and again in a multitude of applications. They're on the *horizon,* too . . . clearly marked for the products of tomorrow.

Helping push this progress in the foundry is Campbell, Wyant and Cannon. From the cupolas, electric furnaces, and converters of CWC flow metals with a background based on new ideas, new processes, new methods in casting techniques. Not content with producing the best of today's castings, the engineers of CWC are already planning the things to come. Remember, for all that's new in castings, keep your eye on Campbell, Wyant and Cannon.

CAMPBELL, WYANT AND CANNON
FOUNDRY COMPANY
Muskegon, Michigan



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Laminated Phenolic Tubing

ENSURES BETTER PERFORMANCE IN COUNTLESS ELECTRICAL PRODUCTS . . . AND . . . LOWERS PRODUCTION COSTS

Clevelite is known the world over for its moisture resistance, dimensional stability, high dielectric strength, low loss and great physical strength. It meets the most exacting specifications.

Proven applications include . . . armature shaft spacers, insulators and brush holders; relay stack insulators and spacers, rectifiers, and as the outer casing on mercury contact relays, as well as replacements for other materials in tubular form.

Available in diameters, wall thicknesses, and lengths as desired.

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• All-Fibre Cans • Combination Metal and Paper Cans
• Spirally Wound Tubes and Cores for all Purposes
PLANTS AND SALES OFFICES: Cleveland, Detroit, Chicago, Plymouth, Wisc., Jamesburg, N. J., Ogdensburg, N. Y. • ABRASIVE DIVISION at Cleveland
SALES OFFICES: Grand Central Terminal Bldg., New York City; Washington Gas Light Bldg., Washington, D. C.; West Hartford, Conn.; Rochester, N. Y.
Cleveland Container Canada, Ltd., Prescott, Ontario • Offices in Toronto and Montreal

Wilson Explains Policy

(*Continued from page* 19)

It was disclosed that the Defense Department budget estimate for fiscal 1955 will be based on the results of studies to be conducted later this year by the Joint Chiefs of Staff. Mr. Wilson made it clear that it would be his purpose to eliminate by any feasible means the peak and valley character of effort which has militated against the efficient and economical operations of the aircraft industry in the past.

With Mr. Wilson were Harold E. Talbot, Secretary of the Air Force, Under Secretary James H. Douglas, Jr., Assistant Secretary Roger Lewis, Gen. Thomas D. White, Gen. Orval R. Cook, and other Air Force representatives. Included in the group were Under Secretary of the Navy Charles S. Thomas and Rear Adm. T. S. Combs, Chief of the Bureau of Aeronautics.

The Aircraft Industries Association was represented as follows: E. B. Newill, general manager, Allison Div., General Motors Corp.; William M. Allen, president, Boeing Airplane Co.; Joseph T. McNarney, president, Consolidated Vultee Aircraft Corp.; Roy T. Hurley, president, Curtiss-Wright Corp.; Donald W. Douglas, Sr., president, Douglas Aircraft Co.; Donald W. Douglas, Jr., vice-president, Douglas Aircraft Co.; Richard S. Boutelle, president, Fairchild Engine and Airplane Corp.; Ralph J. Cordiner, president, General Electric Co.; C. W. LaPierre, vice - president, General Electric Co.; Robert E. Gross, president, Lockheed Aircraft Corp.; George M. Bunker, chairman, Glenn L. Martin Co.; J. S. McDonnell, president, McDonnell Aircraft Corp.; J. H. Kindelberger, chairman, North American Aviation, Inc.; Oliver P. Echols, chairman, Northrop Aircraft, Inc.; L. L. Brabham, vice-president, Republic Aviation Corp.; H. M. Horner, president, United Aircraft Corp.; W. P. Gwinn, vice-president, United Aircraft Corp.; D. C. Ramsey, president, Aircraft Industries Association.

Firm Tells Workers

Republic Aviation Corp. told its 22,000 employees that contemplated cuts in the Air Force budget will not affect production at the firm's Long Island plants.

"Every Republic airplane presently under contract with the Air Force or planned under new schedules will go forward as scheduled," Lowery L. Brabham, vice-president, said. The firm has contracts or letters of intent from the Air Force through 1955.

Obsolescent, if!

These strong and able hands work a constantly shorter week at a steadily rising wage. Labor is producing less and less at a higher unit cost, IF . . .

. . . IF its productivity is measured in terms of output on yesterday's machine tools!

But *why* those old machines? Why—with management never more conscious of cost and the need to reduce cost—with never less likelihood for reducing cost in the areas of wages or taxes? Why—when greater productivity through new and improved machine tools offers the obvious, and only, way out?

Why again, with machine tools like today's Monarch lathes on the market? We can point, at random, to new Monarch installations that have effected a first year labor saving amounting to 49½% of lathe costs—or a tooling reduction of over $4,000.00—or a *two-lathe* output equal to that of four *less modern* machines.

You may think the answer is that your equipment is not yet fully depreciated and may not be for several years. There are taxes and higher replacement costs to consider, too.

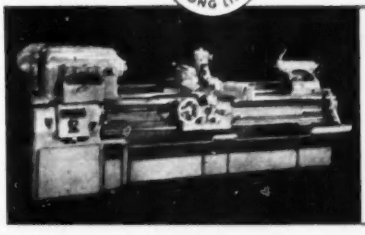
But we all have partial reserves and we all have earnings. And dollars don't maintain output. Machines do! Those dollars now available for machines that will balance off the labor factor with higher output are reserves for *productivity*. Invest them for that—now. . . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES



Monarch Series 60 with Air-Gage Tracer—for quick, automatic duplication of contours. Monarch has built fine lathes for production line and toolroom since 1909—has pioneered the use of tracer controls since 1930.

Labor Contracts

(*Continued from page 20*)

employes that it does not agree with the principle of revising long term contracts when either party wants revisions. The company is sticking to the old BLS index which calls for a pay cut of two cents an hour. It also will retain the current four cents an hour annual improvement factor which falls due in August. Harvester said, however, that it is willing to discuss the matter of changing to the new index when the old BLS index is abandoned following the June publication. Under the new index which has been accepted by the Big Three hourly rates are unchanged.

The contracts are not identical in all respects and the exceptions will be noted.

Of the 24 cents current cost of living allowance which has accumulated since this type of contract went into effect in 1948, 19 cents will be frozen into the base pay, leaving the allowance at five cents an hour.

All classifications of skilled employes will receive a pay increase to maintain the percentage differential between skilled and unskilled workers which had been narrowed by the hourly rate adjustments. Most categories will receive 10 cents an hour more with certain other more highly skilled workers, such as die sinkers, pattern makers, pattern layout men and checkers, and die model builders receiving an increase of 20 cents an hour.

The annual improvement factor will be raised one cent an hour to five cents.

The New Index

The new revised BLS consumer price index will be adopted for calculating fluctuations in the cost of living allowance. Any downward changes in the current five cents allowance will be adjusted at the rate of one cent an hour for each 0.68 change in the new index. Upward adjustments beyond the five cents allowance will be at the rate of one cent per hour for each 0.6 change in the index. The 0.68 figure is considered equivalent to the 1.14 level at which one cent an hour changes were made either up or down under the old BLS price index.

Pension payments applying to past as well as future pensions are increased to $1.75 per month for each year of service up to 30 years, making the maximum monthly pension payments, including social security, $137.50. Ford employes will be offered the option of selecting the more liberal of two pension formulas based on length of service plus social security benefits.

Ford and Chrysler make it possible for retired employes to purchase hospitalization and surgical insurance for themselves and their families at group rates. Ford also gives current employes the option of selecting group hospital plans other than Blue Cross by mutual agreement. A special provision in the Chrysler contract permits the corporation's employes in California the choice between Blue Cross or another specified plan in use on the west coast.

Ford First

One provision singular to the Ford agreement is pro rata payment of accumulated vacation pay for retiring employes. It provides 1/12 of the employe's annual vacation pay for each full month intervening between date of the last vacation and his retirement date. Chrysler has a different vacation provision that has been in existence since the current five year contract was signed.

Current negotiations with the Big Three were somewhat unusual in that the union accepted settlement with General Motors without any provision

(*Turn to page 153, please*)

CUT COSTS . . . FASTEN "ON THE DOUBLE" with the Chicago "214" DOUBLE RIVET SETTER

The "214" automatically feeds, inserts and clinches two rivets at a time . . . with speed that may mean a big saving in your fastening costs. 14" throat makes large assemblies easy to handle. For up to 9/64" diameter steel rivets — lengths to 7/8". Quick Change Rotary Type Hoppers and Raceways permit a 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility. Ask us how the "214" can help you cut costs. Send a sample of problem assembly (or blue print) for Free fastening analysis.

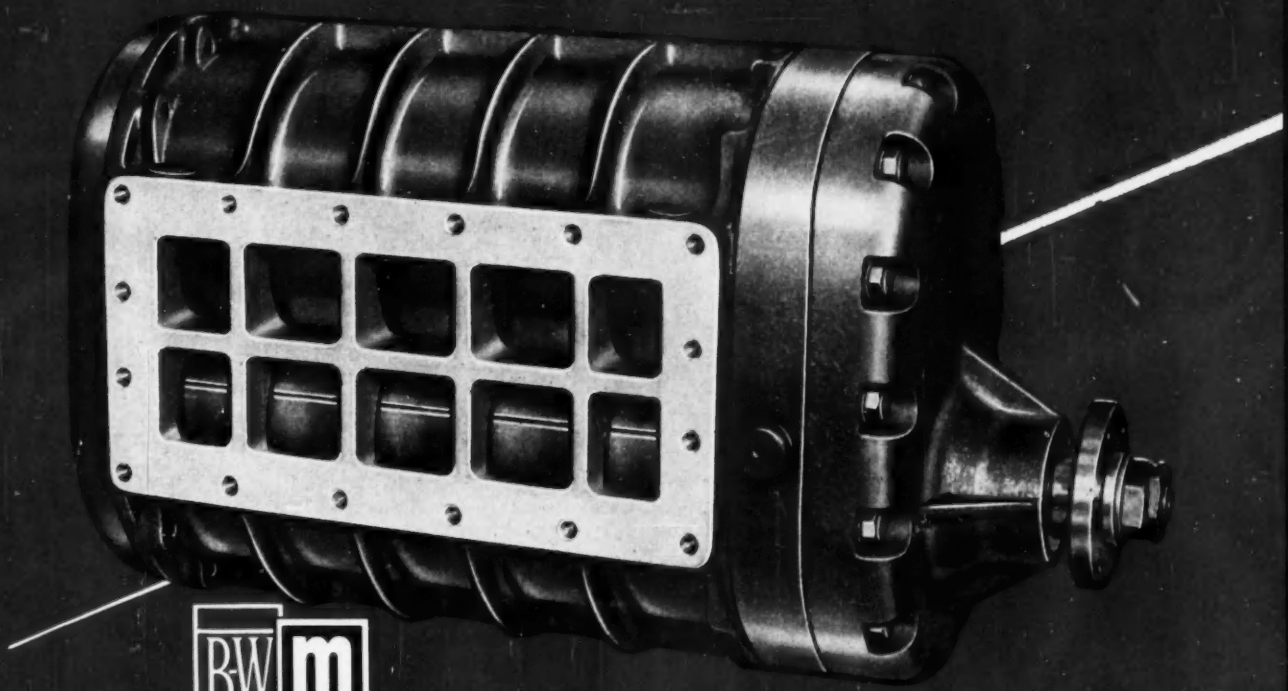
FREE CATALOG

contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.

9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

Branch Factory: Tyrone, Pa.



B-W m d

A NEW NAME FOR A famous Supercharger

MIEHLE-DEXTER supercharger boosts power, decreases weight-to-horsepower ratio on leading Diesels.

Extra Power to Pull Heavy Loads! Power that means less engine space, less weight per horsepower and more *usable* horsepower. That's supercharging with performance-proved M-D supercharger.

Lab tested for efficiency at Borg-Warner's supercharger laboratory, it's the same supercharger proved for staying power, efficiency and low maintenance service on leading Diesels.

Exclusive Features Improve Performance. The M-D supercharger's exclusive end plate design and tip insert reduce rotor end clearance and improve engine fuel economy. Lightweight 3-lobe rotor cuts vibration and allows high speed safely . . . to improve efficiency.

Specify standard M-D models for your applications from 100 to 750 h.p. Or for special requirements consult your M-D engineer.

For more facts write Miehle-Dexter Supercharger Division, Racine, Wisconsin.

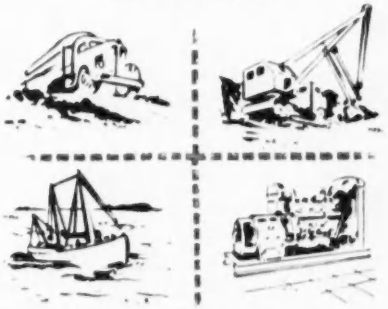
FIELD TESTED ON LEADING DIESELS

The M-D supercharger has won universal acceptance on engines produced by many of the leading Diesel Engine manufacturers, including the following:

Buda Cummins Murphy

Venn-Severin Hercules

Fairbanks-Morse



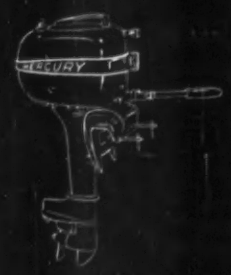
The M-D positive displacement supercharger is now engineered and produced by the Miehle-Dexter Supercharger Division of the Dexter Folder Company. The Division maintains complete servicing and repairs for new superchargers and for the thousands now in operation.

m d

MIEHLE-DEXTER SUPERCHARGER DIVISION

100 FOURTH STREET • RACINE, WISCONSIN

THE LEADERS LOOK TO THE LEADER



Kiekhaefer uses C/R Oil Seals

Slim, sleek, compact and powerful, Mercury outboard motors, made by the Kiekhaefer Corporation of Fond du Lac, Wisconsin, give true championship performance in each horsepower class. They're thoroughbreds in every sense of the word . . . dependable offspring of "thoroughbred" engineering!

Many fine points of design and engineering have combined to produce the exceptional reputation of Mercury outboards. Not the least of these is the consideration which Kiekhaefer engineers have given to the ever-present problem of lubricant retention and water exclusion. C/R "Perfect" oil seals have long been their choice to deliver dependable service through the lifetime of the motor.

Four specially designed C/R oil seals, with Sirvene synthetic rubber sealing members, are used to protect Mercury's "Full Jeweled Power"* at these strategic points: On the main crankshaft bearings; at the top and bottom of the power head; at the bottom of the drive shaft to protect the drive shaft bearings; and between the gear and pump on the propeller shaft.

This is another example of the leaders looking to the leader, for research, engineering and manufacture of the highest type. If you have a particularly tough lubricant sealing or dirt exclusion problem, put it up to Chicago Rawhide engineers.

C/R, the most widely used oil seals, are stocked in over 1,800 sizes covering 16 different types for immediate delivery. Our free handbook, "Engineering with C/R Oil Seals" belongs in your files. Allow us to send it to you.

**Ball and Roller Bearings throughout.*

CHICAGO RAWHIDE MANUFACTURING CO.
1310 Elston Avenue **OIL SEAL DIVISION** Chicago 22, Illinois

More automobiles, farm and industrial machines rely on C/R oil seals than on any similar sealing device.

75 C/R FIFTH ANNIVERSARY

PERFECT Oil Seals

Labor Contracts

(*Continued from page* 150)

for pension increases or medical and surgical benefits for retired employes, two of its original demands. However, after it had obtained these concessions from Ford and Chrysler it requested the same from General Motors and obtained the higher pensions, although nothing was done on hospitalization and surgical benefits or vacation pay.

Cost Is Nominal

Cost of the settlement generally is not considered excessive, totaling about $7 million annually for Chrysler, and estimated in the area of $25 million for General Motors. Ford has not indicated its estimate of the cost. Industrial leaders generally conceded there was considerable merit to the increases for skilled classifications and freezing 19 cents into the base pay out of the cost of living allowance does not increase payrolls. There also was no great argument about increasing the annual improvement factor since it now represents about the same total percentage of hourly rates that it would when the original contracts were signed. There is, however, some doubt about the validity of industry's obligation to increase pensions for retired employes and there is some concern that a principle may have been established that may yet prove extremely troublesome in years ahead. Unquestionably the precedent established in increasing pensions will encourage the UAW-CIO in its announced objective of increasing retirement benefits to $200 a month.

Two Way Street

Another basic point—that of the "living document" character of long term agreements which is being heralded so loudly by the union—is not quite so clear as to its ultimate significance. Whether or not the unions will embrace that principle so warmly in the event of a sizable falling off in business activity so that the base rate "floor" might be several cents an hour higher than would be justified by the BLS index is an open question. Industry in that case certainly would have powerful precedent to ask that the contract be revised in the light of existing economic conditions.

Whittington Branch

Whittington Pump & Engineering Corp. has announced the formation of a subsidiary known as Whittington Fabricating Co. The latter has an extensive line of facilities for cutting, forming, and welding 16-gage sheet through ¼-in. plate.

ADVERTISEMENT

CHEMICALS ACP PROCESSES

phosphate coating chemicals

TO MAKE YOUR PRODUCT DURABLE

PAINT BONDING

"GRANODINE"® forms a zinc-iron phosphate-coating bond on sheet metal products—automobile bodies and fenders, refrigerator cabinets, etc.—for a durable, lustrous paint finish.

"LITHOFORM"® makes paint stick to galvanized iron and other zinc and cadmium surfaces.

"ALODINE",® the new ACP protective coating chemical for aluminum, anchors the paint finish and protects the metal.

RUST PROOFING

"PERMADINE",® a zinc phosphate coating chemical, forms on steel an oil-adsorptive coating which bonds rust-inhibiting oils such as "Granoleum."

"THERMOIL-GRANODINE"® a manganese-iron phosphate coating chemical, forms on steel a dense crystalline coating which, when oiled or painted, inhibits corrosion.

PROTECTION FOR FRICTION SURFACES

The oiled "THERMOIL-GRANODINE" coating on pistons, piston rings, cranks, camshafts and other rubbing parts, allows safe break-in operation, eliminates metal-to-metal contact, maintains lubrication and reduces the danger of scuffing, scoring, galling, welding and tearing.

IMPROVED DRAWING AND COLD FORMING

"GRANODRAW"® forms on pickled surfaces a tightly-bound adherent, zinc-iron phosphate coating which facilitates the cold mechanical deformation of steel, improves drawing, and lengthens die life.

Send for descriptive folders and Government specifications chart on the above chemicals. Write or call for more information on these products, and advice on your own metal-working problem.

AMERICAN CHEMICAL PAINT COMPANY

General Offices: Ambler, Penna.

Niles, Calif. Detroit, Mich. Windsor, Ont.

Industry News

(*Continued from page* 23)

U.K. Dominates Car Imports of U. S.

The United Kingdom last year dominated the field of imports of motor vehicles to the United States, accounting for nearly 94 per cent. According to AMA, imports of new passenger cars from the United Kingdom totalled 31,244 with a value of slightly more than $41 million. In second position, but far behind, was West Germany with 1341 units, having a value of $2,142 million. Canada was in third place with 323 cars worth $367,798. Italy was fourth with 232 units having a value of $849,875.

Other countries represented included France with 146; The Netherlands 17; Mexico three; Sweden two; and the Bahamas, Denmark, Japan and Russia with one each. A total of 483 new trucks and buses was imported with a value of $812,701. Canada was the largest producer with 383, followed by the United Kingdom with 92. Other countries were France and West Germany with three each and Japan and Mexico with one unit apiece. The total number of new cars and trucks imported was 337,950 with a total value of slightly more than $45.5 million. Used cars imported numbered 633 with a value of $679,-921.

Maremont to Build Puerto Rico Plant

Maremont Automotive Products, Inc. is planning to build a spring manufacturing plant in San Juan, P. R. to supply all its export needs. The company also has formed three new wholly owned subsidiaries to augment its expansion in the export field. They are Maremont International Corp., operating in the Western Hemisphere; Maremont Overseas Corp., operating outside the Western Hemisphere; and Maremont Manufacturing Corp., which will operate the new Puerto Rico plant. Both the marketing subsidiaries will handle the company's complete line of mufflers and coil springs.

Titanium Research

Worcester Pressed Steel Co. announced it has been awarded a contract by Army Ordnance for a study of the forming properties of titanium. This contract was negotiated by the Boston Ordnance District and will be under the technical supervision of the Watertown Arsenal.

The study will be concerned with both alloy and commercially pure types of different thicknesses. Tests will be conducted at varying temperatures and at varying speeds, and will work to limiting conditions on percentage of draw.

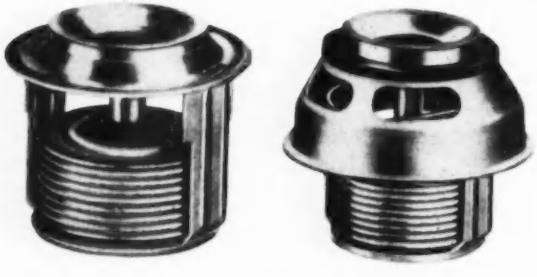
New Plastic Plant

Cadillac Plastic Co. announces the formation of their fiber glass division. The new affiliate will immediately occupy a 15,000 sq ft building at John R and Milwaukee streets, Detroit. The plant has complete facilities for the manufacture of automotive, aircraft and allied parts from fiber glass by low-pressure molding and laminating. Two 100-ton presses, plus six other presses, running from 10 to 60-ton capacity, together with other equipment, are already in operation. Both match-metal die work and hand lay-up will be done. The Division will also manufacture dies and fixtures for other molders and will warehouse fiber glass cloth for resale to the trade.

(*Turn to page* 156, *please*)

Improved Design
Boosts Preference For
FLEXON THERMOSTATS

Integral Stem Guide
Aids Trouble-Free Service



FLEXON THERMOSTATS
feature the only important
Thermostat improvement in years

The Flexon Thermostat is a bellows type, precision built instrument designed with a new aid for proper heat control—the integral Stem Guide. The guide is accurately stamped as part of the top plate and provides precision centering and control of the stem. This means positive seating of the valve and true alignment for dependable performance. We will be pleased to discuss your requirements with you and show you how Flexon Thermostats can help you. Write, wire or phone, today.

Flexonics Corporation 1376 S. THIRD AVENUE · MAYWOOD, ILLINOIS
FORMERLY CHICAGO METAL HOSE CORPORATION
Flexon identifies CMH products that have served industry for over 50 years.
Manufacturers of flexible metal hose and conduit, expansion joints, metallic bellows and assemblies of these components.
In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

ARO AIR TOOLS MEAN *faster assembly* for DOUGLAS AIRCRAFT

LONG BEACH DIVISION

DRILLING—Mr. Kenneth Hall, Tool Engineer at Douglas, Long Beach, inspects operation of Aro Right Angle Drill for close-corner work.

DRILLING—Aro Aircraft Drills speed production . . . models range from 500 to 17,000 R.P.M.

•

SANDING—Aro Vertical Sander smooths weld seams rapidly. High power in proportion to weight.

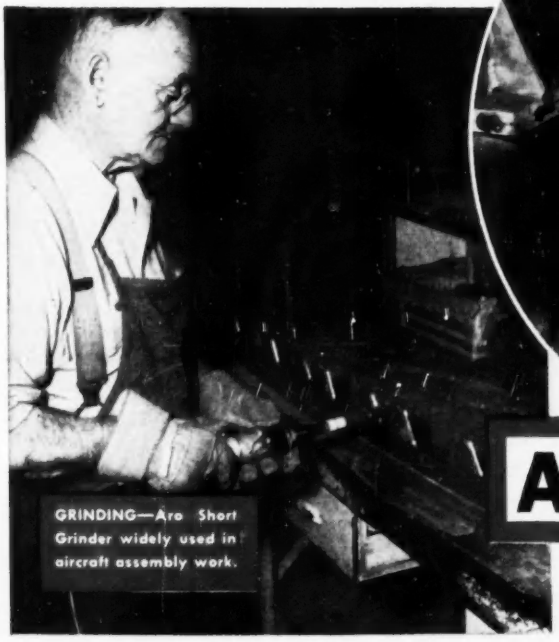
These are typical of hundreds of assembly jobs performed by ARO Air Tools in the Douglas Aircraft plant at Long Beach, Calif.—to meet demands for *high speed, efficient* production!

Do you have similar production problems in screwdriving, nutsetting, grinding, sanding, drilling, mixing, etc.? An ARO Field Engineer will gladly help in engineering your job or *contact your Aro distributor.*

The Aro Equipment Corporation, Bryan, Ohio

Offices in All Principal Cities

In Canada: Aro Equipment of Canada, Ltd., Toronto, Ont.



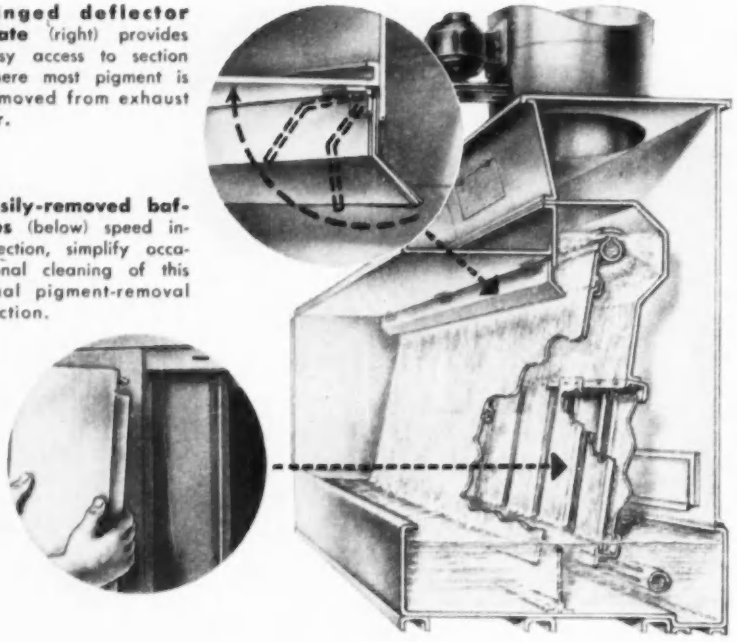
GRINDING—Aro Short Grinder widely used in aircraft assembly work.

ARO AIR TOOLS

Also . . . LUBE EQUIPMENT . . . HYDRAULIC EQUIPMENT . . . AIRCRAFT PRODUCTS . . . GREASE FITTINGS

Hinged deflector plate (right) provides easy access to section where most pigment is removed from exhaust air.

Easily-removed baffles (below) speed inspection, simplify occasional cleaning of this final pigment-removal section.



NEW Spray Booth lowers maintenance costs

The enemy of economy in most spray booth installations is time-consuming cleaning. But now, with these time-saving features of Binks new DUC Water-Wash Spray Booth, you'll at last find the cleaning ease you've hoped for:

Binks DUC Water-Wash cuts cleaning time because it prevents build-up of pigment on booth surfaces. Through sudden changes in direction of air flow, centrifugal force flings pigment out of the air. Water flushes virtually all pigment into the pan at the base of the booth for easy removal.

Binks DUC Water-Wash cuts cleaning time by eliminating difficult maintenance procedures. As the illustrations show, the deflector plate swings back and the baffle plates come out without tools to provide swift accessibility to the major sections of the booth.

You'll save money other ways, too. The DUC saves floor space, uses the same water over and over again. And Binks guarantees that every DUC installation exceeds the requirements of fire, health and state authorities.

Send for your FREE copy of Bulletin DUC...

Describes the 7 major advantages this booth provides to save you time and money. Facts backing each claim thoroughly explained with pictures and sketches. See your Binks industrial distributor or send in coupon.

MAIL COUPON for Bulletin DUC—it's FREE!

Binks Manufacturing Company
3120-30 Carroll Ave., W., Chicago 12, Ill.

Gentlemen: Please rush my FREE copy of your bulletin DUC describing your new Dynaprecipitor Water-Wash Spray Booth.

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COMPANY _____

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CITY _____ ZONE ____ STATE _____

Binks
EVERYTHING FOR SPRAY PAINTING

REPRESENTATIVES IN PRINCIPAL U. S. & CANADIAN CITIES · SEE YOUR CLASSIFIED PHONE DIRECTORY

Industry News

(*Continued from page* 154)

Government Contracts Canadian Molybdenite

Defense Materials Procurement Agency has negotiated a contract to buy up to six million lb of molybdenite during the next five years through the Molybdenite Corp. of Canada, Ltd. In addition to its option on molybdenite, which is used in alloy steel production, the agency also has first call on the company's production of bismuth. The agreement involves expansion of the Canadian company's mining facilities at its own expense in return for a guaranteed sale of its products at a stipulated floor price to DMPA in the event it cannot sell any unordered part of the optional production elsewhere at a higher price.

Detroit Car Dealers Plan February Show

Detroit automobile dealers next February will hold their first automobile show since before the war. The show will be staged at the Michigan State Fair Grounds, which recently was surveyed by the automobile manufacturers as a possible site for a national show but rejected on the basis of being too costly for alterations. The committee estimated that it would cost about $1 million to put the Fair Grounds in shape for a national exhibition. The Detroit dealers, however, are not expected to assume any conversion job of that proportion, but will have to go to some expense to make ready the four buildings which will be used for their show.

Record Import for Mexico

Mexico imported a new record of 15,819 automobiles assembled outside the country in 1952, at a cost of $19,831,873 according to the Bureau of Statistics of the Department of National Economy. This compares with the 281 assembled outside of the country imported in 1951, for a total cost of $270,943. The extreme jump is attributed to easing of import regulations and heavy demand which could not be met by local assembly plants.

Mexico will permit maximum production in local assembly plants for the current year at 30,000 vehicles, nearly half trucks and buses. It is believed that this will satisfy national

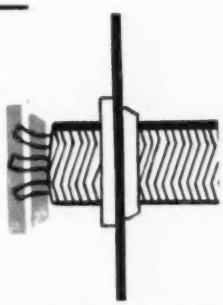
(*Turn to page* 158, *please*)

C-D-F *know how*

Designed and Fabricated this DILECTO GROMMET

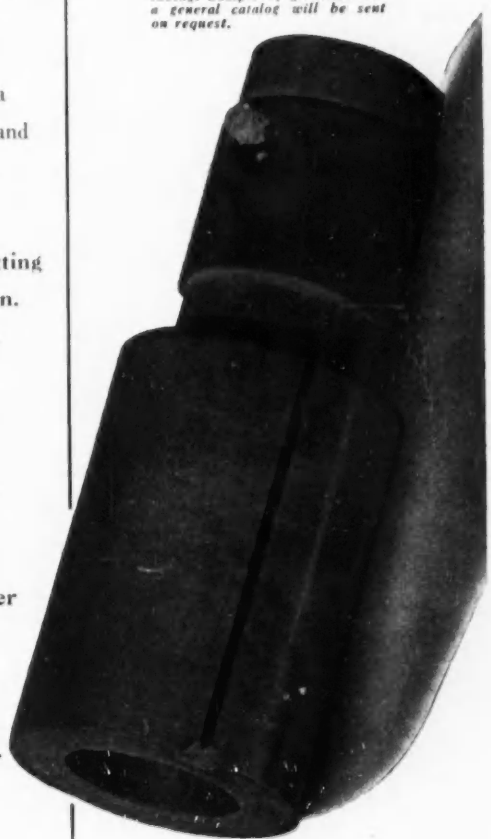
It springs out and holds tight!

Here's an idea and an example of C-D-F engineering skill teamed up with versatile Dilecto — laminated rolled plastic tubing — that can help you. Thousands of Dilecto grommets are being used in the aircraft industry for wire and cables that pass through bulkheads. Made from fine weave canvas, the C-D-F Dilecto grommet is cut into rings. The rings are grooved and beveled, then slit diagonally. The Dilecto grommet has a built-in tension that permits it to be easily compressed by hand and inserted in the bulkhead. Tension holds it tightly in place. It cushions. It insulates. It reduces assembly time.



Here's a side-view of a Dilecto grommet, machined to close tolerances from laminated rolled tubing. Sample of grommet and a general catalog will be sent on request.

DILECTO is a C-D-F top quality laminated thermosetting plastic whose uses are limited only by the imagination. Supplied in sheets, rods, tubes, Dilecto answers most electrical and radio needs for a material that is mechanically and dielectrically strong . . . resistant to high heat, hot oil, excessive humidity. It can be punched, stamped, formed and machined to close tolerances. Investigate its possibilities. Available in many grades to meet a variety of requirements. A qualified plastics specialist, your C-D-F sales engineer (offices in principal cities) will help you engineer a better product. Why not call him today!



Another example of a part machined from Dilecto rolled tubing. Notice variety of machining steps and the possible versatility of this mechanically strong material. Only C-D-F makes Dilecto in sheet, tube and rod forms.

THE NAME TO REMEMBER — DILECTO LAMINATED PLASTIC

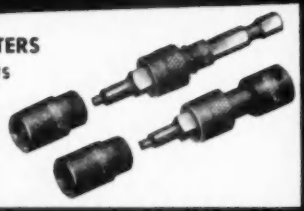
Continental-Diamond Fibre Company

NEWARK 2, DELAWARE

PRODUCTION SOCKETS FOR ALL TYPES OF PRODUCTION NUT RUNNING

MAGNETIC SHANKS AND ADAPTERS
FOR DRIVING HARDENED TAPPING SCREWS

By... magnetically... holding the screw head or nut within the socket opening, faster speeds and greater efficiency are gained — especially on production-assembly jobs. Available with ¼" square female drive or ¼" hex male drive.

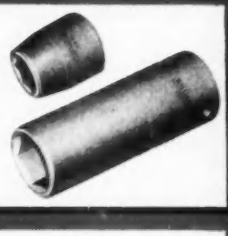


HEXAGON SOCKETS WITH CARBIDE INSERTS
FOR LONG-RUN ASSEMBLY PRODUCTION
WITH HARDENED SELF-TAPPING SCREWS

You can expect, and get, at least 10 times more service life by using these sockets in driving case-hardened, self-tapping screws. Use with power tools or hand drivers. Available in ¼ or ⅜" square drives with hex openings from ¼ to ½".

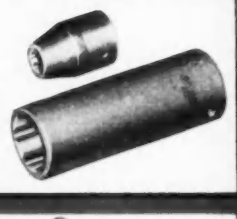
SINGLE HEXAGON OPENINGS
IN SEVEN DRIVE SIZES

Providing utility, efficiency and economy over a full range of job applications, these IMPACT "Supersockets"® are the work-horses of the Williams line. Available in regular and bolt clearance lengths ¼, ⅜, ½, ⅝, ¾, 1 and 1½" square drive sizes with range of openings from 5/16 to 3½".



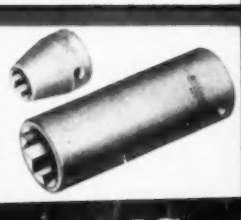
SURFACE DRIVE OPENINGS
IN TWO DRIVE SIZES

For all types of multiple nut runners or used singly, these sockets allow the driving unit to be freely engaged and disengaged from the work while providing full bearing on the nut. Available in ½ and ⅜" square drives with range of openings from ⅜ to 1¼".



DOUBLE SQUARE OPENINGS
IN FOUR DRIVE SIZES

For driving square nuts or square head bolts, these sockets seat fast, grip firmly and are long wearing. Available in ⅜, ½, ⅝ and ¾" square drives in regular and bolt clearance lengths with openings from 5/16 to 1¼".



WRITE FOR CATALOG A-100
Your industrial distributor can supply IMPACT "Supersockets" from local stocks

WILLIAMS
IMPACT "Supersockets"®

J. H. WILLIAMS & CO., 500 Vulcan Street, Buffalo 7, N. Y.

Industry News

(*Continued from page* 156)

demands for the year and that there will be no necessity to repeat the heavy 1952 imports. The Mexican auto assembly industry will not have easy sailing this year due to high prices of cars, heavy depreciation and resistance of new auto buyers to trade in for new cars. Chief symptom of a brake on activity is seen that this year's production will only run around 50 per cent of 1952.

Dealers, secured by the protective duties which were promulgated to aid the national assembly industry, have recently come to a "secret" agreement, arbitrarily fixing prices of used cars, in accordance with makes, models and age, without taking into consideration the actual physical state of the vehicle or added equipment.

For example, a DeSoto Custom four door sedan, with a list price of $3950 in 1950, depreciated in value to $2320 in 1951, and in January this year value stood at $1720. Other heavy cars show an even greater depreciation ratio and the only ones that conserve their value appear to be lowest-priced models, but only on proof that they have not been used as taxis. These drastic depreciated prices agreed upon by dealers are not attracting trade-ins for new cars.

The Department of National Economy in Mexico recently announced that importation of repair parts and materials used for the assembly of foreign make automobiles in Mexico will be subject to prior permits. Parts and materials imports had not been regulated for some time.

Commercial Relations

Traders wishing to contact firms in Holland can apply to the Commercial Intelligence Office, Oudebrugsteeg 16, Amsterdam-C. With the object of stimulating export and import, offers and demands are published free in their fortnightly bulletin Buvoha Mededelingen, distributed in an edition of 5000 copies among industrial and commercial firms in Holland.

They also publish once a year the Buvoha Trade Letter. This letter is distributed all over the world and contains addresses of Dutch firms looking for new trade connections abroad. Interested parties can apply for a free copy.

New Planes

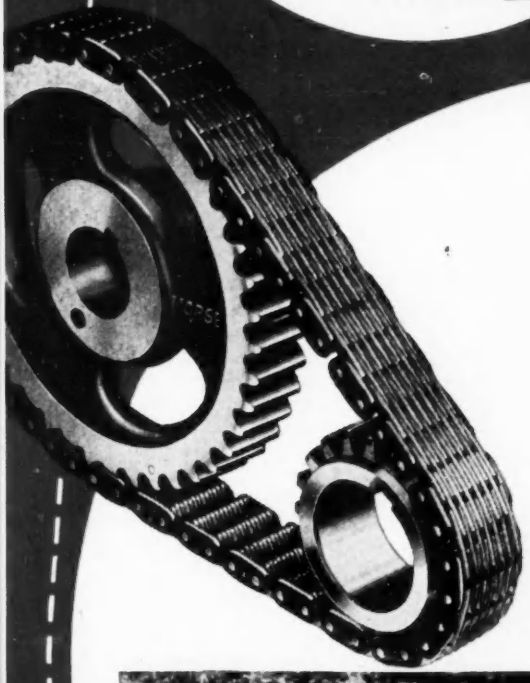
Details of the Lockheed C-130 assault transport have been released by

(*Turn to page* 160, *please*)

In more ways than one

M=TC

Morse *means* Timing Chains



It almost goes without saying that you get the automotive industry's most dependable timing-chain drives when you specify *Morse*.

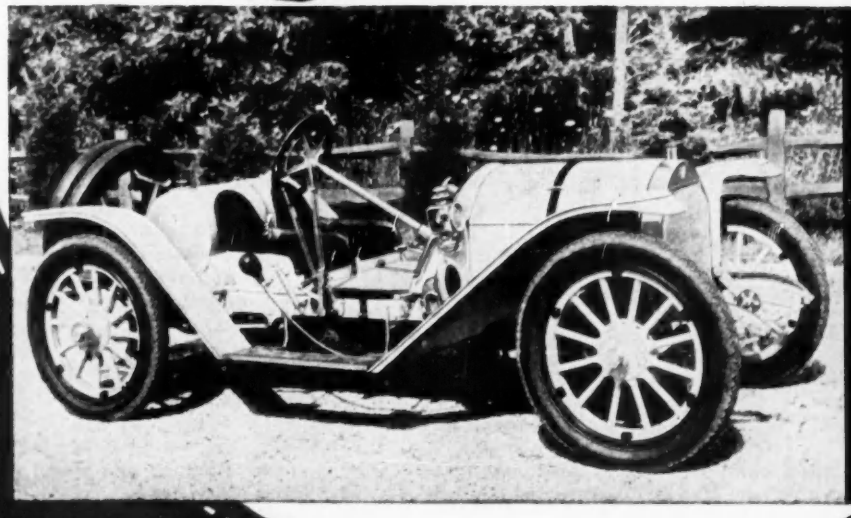
You get prompt, on-schedule delivery, too.

And simply by calling or writing, you can summon some of the industry's finest engineering talent to help you break through barriers in timing-chain drive design, development, or function.

In these ways and many others, M=TC; Morse *means* Timing Chains to the automotive industry.

MORSE CHAIN COMPANY

Dept. 479 • 7601 Central Avenue • Detroit 10, Michigan



(From the Bettmann Archive)

Four-cylinder, thirty-horsepower 1911 Mercer racing sport-car which featured an ear-splitting bulb horn, heavy brass carriage lamp, strap-hold hood, fancy embossed tires, small fire extinguisher mounted on side of driver's seat.

Send for free print

This is one of a series of old automobile prints that will appear in future Morse advertisements. Write for your free, enlarged copy, suitable for framing for your collection.

you've never seen a grinder like this!

the NEW BUCKEYE General Purpose GRINDER

Compact—it fits in your hand like a flashlight (and doesn't weigh a great deal more!), yet it's packed with power enough to handle many grinding jobs that formerly required bigger, heavier tools.

Designed for general purpose grinding, it takes a 2" organic wheel, but can be used with rotary files and cutters as well. Buckeye one-piece shaft construction does away with costly replacement of wearing parts.

Available in two types—lever throttle (as illustrated) or lock button throttle, these grinders are the latest additions to the Buckeye "A" Series—ounce for ounce the most powerful air tools you've ever seen.

We'll be happy to prove that—in your plant, on your work. Just tell us when and where, then you be the judge.

Available with collet adapter for mounted wheels.

What are you waiting for?

Buckeye Tools CORPORATION
DIVISION 21 • DAYTON 1, OHIO

Portable Air and Electric Tools for Industry

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

Industry News

(*Continued from page* 158)

the company. The high-wing cargo plane will be powered with turbo-propeller engines, and will operate at twice the altitude of most present airline transports. Construction features include extensive use of machined panels, and landing gear attached at the fuselage instead of at the engine nacelle.

Although Douglas Aircraft Co. has spent over one million dollars on the preliminary plans for its DC-8 jet transport, no immediate production schedule is in prospect.

Officer Claims Jeep Invention

Legislation to permit an Army officer to file suit against the government in support of his claim that he is the "earliest recorded designer" of the jeep gained approval of the House of Representatives recently and was sent to the Senate.

Col. Homer G. Hamilton, Ordnance Corps, will be the beneficiary if the bill becomes law. In an affidavit filed with the House Judiciary Committee, the officer stated that in 1935 he prepared a drawing, specifications, and other data on the vehicle for publication in a magazine covering military subjects. His purpose in allowing this material to be printed, he said, "was to influence Army opinion in an attempt to get such a vehicle produced."

He added that later he had applied for patents through the office of the Army Adjutant General, but was turned down on grounds that publications of details on the proposed small truck "had admitted the matter to public domain."

The Judiciary Committee has made public a letter from the late Robert P. Patterson, at one time the Secretary of War, maintaining that no one individual could be considered the "inventor" of the jeep.

Trucks Pay Third of Special Taxes

About 35 per cent of all special highway user taxes last year were paid by trucks, according to a recent report by the Automobile Manufacturers Association. The high tax trend is continuing this year, and present indication points to federal excise tax payments on new trucks heading for an all-time high.

During the first quarter, the excise tax collection on trucks was at an annual rate of approximately $200

(*Turn to page* 162, *please*)

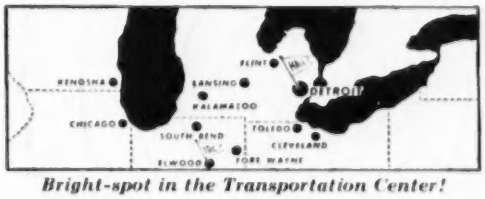
From HALL'S Laboratory Comes Better, Safer Lighting for Transportation

In this HALL lighting laboratory, highly skilled technicians study optical forms and sources of light. Working with specialized equipment they conduct various tests to assure maximum efficiency from HALL-designed lighting. Complex prisms, flutes, reflectors, light sources, intricate optics and exacting specifications all contribute to the C. M. HALL LAMP COMPANY'S never-ending search for better, safer *Lighting for Transportation*.

States' Approvals Required

States from coast-to-coast set high standards which all transportation lighting must meet. If official approvals lag behind production, motor vehicle manufacturers must know that approvals are forthcoming. The slightest error in engineering or design would mean delays and costly revisions. In its 42 years, HALL has never failed to earn State approvals!

All C. M. HALL LAMP COMPANY customers benefit from this fully equipped laboratory, the only one of its kind in the heart of the automotive industry.



Bright-spot in the Transportation Center!

C.M. HALL Lamp Company

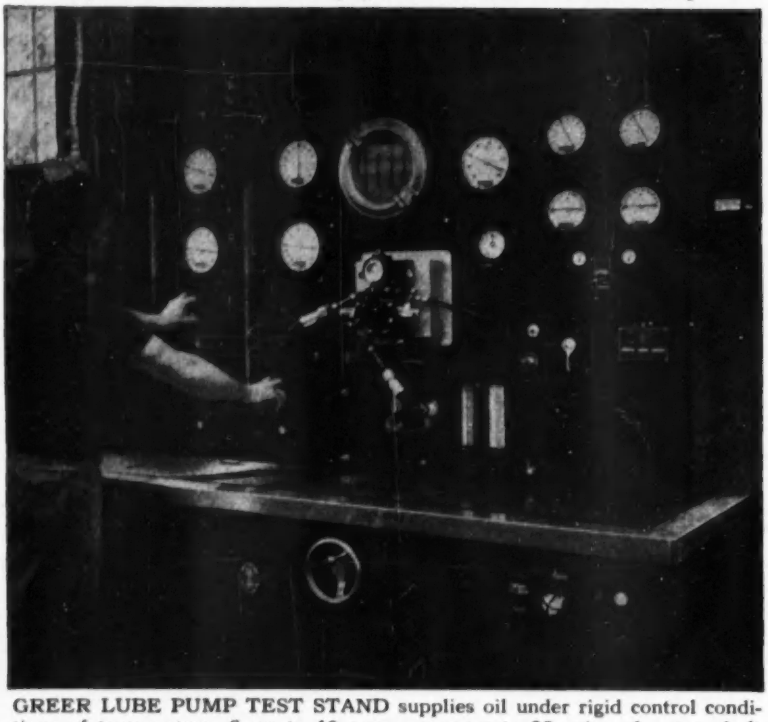
Vision for Transportation

1035 EAST HANCOCK AVENUE • DETROIT 7, MICHIGAN

and its wholly-owned subsidiary INDIANA DIE CASTINGS, INC. ELWOOD, INDIANA

GREER TOPICS

Important News of Greer Equipment for Aviation and Industry



GREER LUBE PUMP TEST STAND supplies oil under rigid control conditions of temperature, flows to 10 gpm, pressures to 28 psi, and pump shaft speeds to 5000 rpm. It accurately checks the main oil pump assembly of the J-65 turbojet engine for the Wright Aeronautical Division, Curtiss-Wright Corp.

Greer Builds Complex Lube Pump Tester for Wright Aeronautical

Precision engineered from ten pages of rigid specifications to accurately test main oil pump assembly of J-65 turbojet engine

The test machine pictured above is another good example of Greer designed-to-order equipment. In this case, the customer provided specifications—in other cases, the entire test problem is turned over to Greer engineers who design and build precision equipment to do a specific job.

These out-of-ordinary problems need good men to solve them. There are *good* men at Greer with many years of this specialized experience that is difficult to find, perhaps impossible to match elsewhere.

Greer makes many standard test machines, too, that can be ordered right out of a catalog (a free copy sent on request). Though we call them standard machines, they are not mass-produced; each machine is slowly and painstakingly created, repeatedly tested for accuracy and dependability.

For, whether it is designed for aircraft or general industrial applications, testing equipment must have the complete confidence of those who use it. Greer equipment has that confidence—because Greer has *earned* it.

GREER
TEST EQUIPMENT

Greer Hydraulics Inc. 442 Eighteenth Street, Brooklyn 15, New York

Field Offices: 1908 West Cermak Road, Chicago, Illinois • 25 South Main Street, Dayton, Ohio
2832 East Grand Boulevard, Detroit, Michigan • and sales representatives in all principal cities

Industry News

(*Continued from page* 160)

million, or more than $12 million above the record reached in 1952. Truck excise taxes are up 3000 per cent since 1935, principally because of the big bulge in post-war truck production, although a three per cent increase in the rate also is a factor.

Since the end of the war, truck output has been more than 9.1 million units, or more than the entire industry's production during the 36 years from 1900 to 1937. Registrations since 1945 have nearly doubled; tonnage by for-hire interstate motor carriers is up 125 per cent; truck travel has more than doubled to 95 billion miles; and freight hauled is about 10 billion tons a year, or about 75 per cent of the national total tonnage.

Third Safety Award

Caterpillar Tractor Co. has won the National Safety Council award of honor at its Peoria plant, the third time the unit has gained the honor. The award for outstanding safety performance annually is earned by less than 2 per cent of the nation's industries. Caterpillar's accident frequency rate was 68 per cent better than the national level and the severity rate was 31 per cent below the national average.

New Jobs for AF Aids

Direction and supervision of procurement planning and programming are only a part of the job taken over by Roger Lewis, former vice-president of Curtiss-Wright Corp., when he recently became Air Force Assistant Secretary for Materiel.

A new list of responsibilities assigned by Air Force Secretary Harold E. Talbott to his principal subordinates gives Lewis jurisdiction over these other matters: industrial security and mobilization; production, buying, storage, maintenance, distribution, and disposal of all supplies and equipment; transportation and communications; relations with civil aviation; and renegotiation affairs and contract appeals.

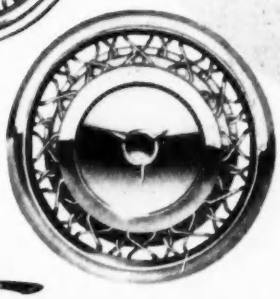
Assignments for Trevor Gardner, who has just become special assistant for research and development, include determination of qualitative requirements in basic and applied research fields and the integration of technology with military needs.

H. Lee White, Assistant Secretary for Management, will guide and supervise personnel matters, budgetary and accounting activities, training,

(*Turn to page* 164, *please*)

WIRE WHEEL COVERS...

and automotive trim



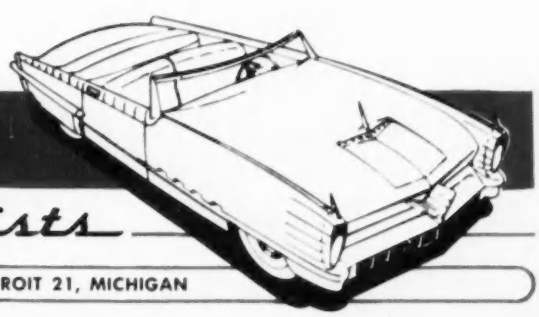
Flashing, custom-styled wire wheel covers, now being offered as optional and accessory equipment on several of the country's leading automobiles, are just one of many specially designed, engineered and manufactured automotive items produced by the A. S. Campbell Company, Inc.

For over 33 years, Campbell has designed and manufactured chrome automotive trim to the exacting specifications of automobile manufacturers.

Creation of new designs and extensive manufacturing facilities for volume production enables Campbell to work hand in hand with automobile manufacturers in producing exclusive yet economical chrome automotive parts.

With new and expanded design and sales offices at 10124 W. McNichols Rd. in Detroit, Michigan, Campbell offers you immediate service and quotation on contemplated chrome automotive stampings and trim.

Specially Designed
Automobile
License
Frame



A. S. CAMPBELL CO. INC.

Styling specialists

EAST BOSTON 28, MASS. • 10124 W. McNICHOLS ROAD, DETROIT 21, MICHIGAN

Anything from pipe to pretzels, Baltimore Stevedoring finds Towmotor more than equal to the task.

The Big Cinch...

Little inch or big one, any job's a lead pipe cinch with Towmotor speeding materials handling up to double and more for you . . . and the boss. Results like that are no pipe dream, thanks to TowmoTorque, the new automatic transmission that helps you crowd extra hours into every working day. And Power Steering that's easy no matter how long your operators drive. Or the new Cushioned Power Diesels that handle like sissies and perform like the frugal brutes they are. Plus many other Towmotor features that help you get so much more done . . . so much more easily. Send today for booklet describing TowmoTorque and Power Steering. TOWMOTOR CORPORATION, Div. 4506, 1226 E. 152nd Street, Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG
®

FORK LIFT TRUCKS and TRACTORS
SINCE 1919

TOWMOTOR ENGINEERED FOR QUALITY PERFORMANCE

Industry News

(*Continued from page* 162)

participation in civil defense projects, and the loyalty-security program.

Over-all direction and supervision of Air Force matters, subject to the control of Secretary Talbott, is the responsibility of Under Secretary James H. Douglas. This official must coordinate activities of all other units within the Office of the Secretary.

K-F Nears Changeover to C-123 Cargo Plane

Kaiser-Frazer is nearing completion on its tooling for production of the Chase-C-123-B transport plane. Most of the 12,000 groups of detail and assembly tools have been placed and tried out and several thousand parts and assemblies have been completed. K-F will be the sole production source for the C-123, which will gradually absorb the entire aircraft production area at the Willow Run plant as the C-119, on which K-F was the secondary source, is phased out of production.

Tube Sizer

Temco Aircraft Corp. has perfected a new process for resizing steel and aluminum tube, making possible tolerances as close as .001 in. A series of egg-shaped steel balls attached to a length of aircraft control cable are drawn under pressure through tube by a hydraulic cable-testing machine. Tube is undamaged when a hard oil lubricant is used.

Commercial Hiller

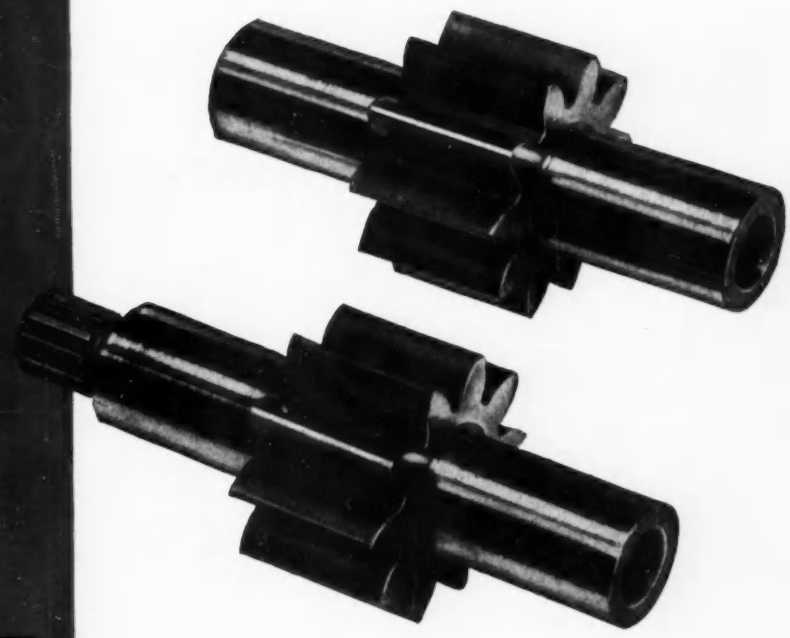
Production of the new Hiller 12-B helicopter at a reduced price, effective last month, was announced by Hiller Helicopters of Palo Alto, Calif.

The Hiller 12-B, similar to the H-23B model currently being delivered to the Army, will be available on a "quick" delivery basis at a list price of $36,000. Powered by a 200 hp air-cooled engine, the Hiller 12-B is a three-place, dual-controlled helicopter, which will include electronic trim controls, fully enclosed cockpit and skid type landing gear as standard.

Record Show Turnout

Attendance, registration and sales from the floor reached an all-time record for the Western Metal Exposition and Congress. This year's show, held in Los Angeles, Calif., the end of March, drew 53,453 people to the show, with registrations of 33,648.

(*Turn to page* 178, *please*)



ONLY 2 MOVING PARTS

do the pumping in a Pesco Hydraulic Pump

This SIMPLICITY OF DESIGN is important for these reasons!

- ***reliability—less chance of pump malfunction***
- ***less maintenance***
- ***less cost for overhaul***
- ***less weight . . . less noise***

Add *Pesco Simplicity of Design* to Pesco's *exclusive*, patented "Pressure Loading" principle, which results in volumetric efficiencies up to 97% and torque efficiencies up to 90%, and you have two important reasons why so many industrial and aircraft manufacturers have standardized on Pesco pumps.

engineering Pesco production

PRODUCTS DIVISION

BORG-WARNER CORPORATION

24700 NORTH MILES ROAD • BEDFORD, OHIO

DIFFERENTIALS by FAIRFIELD

—a plus value in any product!

ROAD GRADERS . . . Lift Trucks . . . Power Shovels . . . Tractors . . . Street Sweepers . . . Road Rollers . . . Trucks and Buses all benefit from Fairfield's 34 years of specialized experience in building complete *differential gear units* for powered vehicles.

If you use DIFFERENTIALS in the product you build, we believe it will pay you as it has others to check with Fairfield on all of your requirements. Fairfield offers (1) Mass Production Economy, (2) Unexcelled Quality, (3) Dependable Service, (4) Expert Engineering Recommendations. YOUR INQUIRY WILL RECEIVE PROMPT ATTENTION. *Send for illustrated brochure, describing Fairfield's facilities.*

FAIRFIELD
MANUFACTURING CO.
2303 South Concord Road, Lafayette, Indiana

MEN *in the* NEWS

(*Continued from page* 25)

Automotive and Aircraft Parts Mfrs. Assn. (Canada): **J. C. Armer** of Toronto was elected president at the first annual meeting. **Neil P. Petersen of Toronto was elected vice-president** and **C. E. McTavish** of Toronto, honorary treasurer.

Directors are: **W. S. Cowell**, Montreal; **E. S. Byers**, Toronto; **William Harrison** and **R. W. Keeley**, Windsor; **D. M. Park** and **H. E. Stipe**, Hamilton; **J. E. Gammage**, Merriton; **E. H. Walker**, St. Catharines, and **A. C. Pullen**, London, Ont. **D. S. Wood** is executive vice-presideat and manager.

National Motor Bearing Co.—**Raymond F. Stanley** has joined the firm as chief industrial engineer.

Jack and Heintz, Inc.—Appointment of **C. F. Herbold** to the newly created position of director of industrial relations has been announced.

Redmond Co., Inc. — **James W. Tweedy, Jr.**, new executive vice-president and general manager, has been named to succeed **James G. Kennedy.** He is in charge of operations in Owosso and Ithaca, Mich., Jacksonville, Ark., and St. Thomas, Ont., plants.

Universal Moulded Products Corp. —Appointment of **Ludlow King** as vice-president, Plastics Div., was announced recently.

Snap-Tite, Inc.—**Armand A. Probeck** has been elected vice-president.

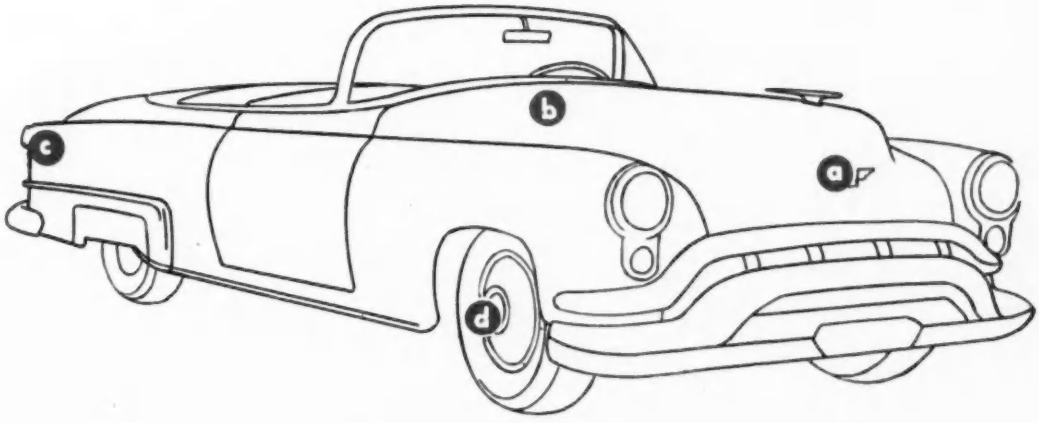
Bingham-Herbrand Corp.—**Jack G. Allen** has joined as a vice-president and general sales manager of the Herbrand Div.

Piasecki Helicopter Corp.—**C. Hart Miller** has resigned as executive vice-president and general manager.

Stewart-Warner Corp. — **Alfred H. Busch** has been confirmed as secretary by the board.

Leece-Neville Co. — **Herbert G. Speck** and **Emery J. Szabo** have been named factory manager and chief engineer respectively.

(*Turn to page* 168, *please*)



A proven material for automotive styling... DU PONT LUCITE*

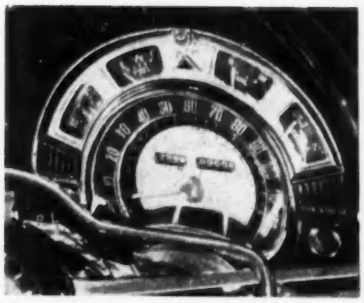
Forward-looking engineers are finding in Du Pont "Lucite" acrylic resin the combination of properties that makes possible many of their new designs in improved styling. Beautiful "Lucite" offers optical clarity, outdoor durability, shatter-resistance, strength and unique "edge-lighting" properties.

A few of the many examples in which these properties have been put to use are shown. Perhaps Du Pont "Lucite" and other members of the Du Pont family of plastic engineering materials can help you blueprint your ideas for the future. For full information, write: E. I. du Pont de Nemours & Co., (Inc.), Polychemicals Department, Room 1761, Du Pont Bldg., Wilmington 98, Delaware.

*REG. U.S. PAT. OFF.

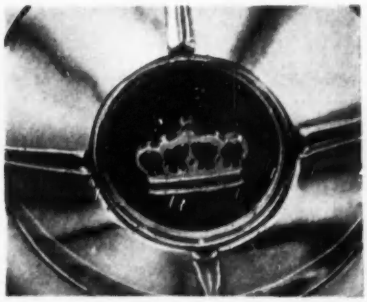
DU PONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY
Polychemicals
DEPARTMENT
PLASTICS • CHEMICALS

a HOOD AND TRUNK MEDALLIONS show the beautiful three-dimensional color effects that can be obtained with durable "Lucite." In normal use Du Pont "Lucite" is unaffected by gasoline or lubricants.



b INSTRUMENT-PANEL FACES are easy to read when made of sparkling "Lucite." Du Pont "Lucite" has excellent light-transmission characteristics . . . can be used to "edge-light" and "pipe" light around curves for greater lighting efficiency.

c TAIL-LAMP LENSES of "Lucite" combine eye-catching beauty with outstanding optical properties. "Lucite" may be molded in intricate shapes. It is strong and shatter-resistant... has good dimensional and color stability.



d HUB-CAP EMBLEMS inset with gleaming "Lucite" add a touch of distinctive styling that customers appreciate. Durable "Lucite" insures lasting beauty despite close-to-the-road service and constant exposure.

Cincinnati
CLEANING MACHINE

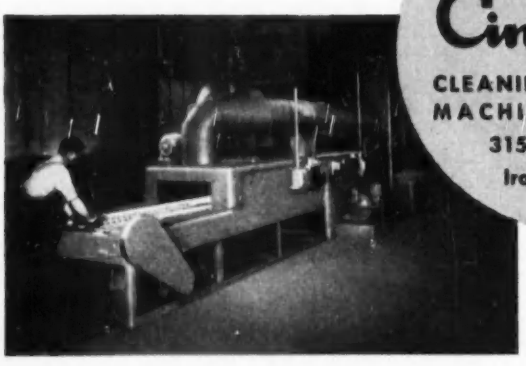
"Tremendous Time and Labor Saver"...

FOR MIDWESTERN MANUFACTURER.....

time saved . . . 75%
labor saved . . . 81%
results . . . much better

Cleaning steel channel and moulding, this firm formerly used methods requiring the full time of four workers every day. Cincinnati engineers studied the cleaning problem, and adapted a Cincinnati wash, rinse, and dry belt-conveyor washing machine to the job. With this machine, results are "much better," and the work is done by only two operators working just three hours per day.

If you have no automatic cleaning equipment, or if you wish to modernize your present equipment to reduce your costs, consult Cincinnati engineers. From long experience, they can show you by case histories closely approximating your needs how a Cincinnati machine or system can improve your cleaning and reduce your costs. Write for latest literature.



Cincinnati
CLEANING & FINISHING MACHINERY CO., INC.
315 Hecla Street
Ironton, Ohio

MEN *in the* NEWS

(*Continued from page* 166)

Houdaille-Hershey Corp. — **Robert Montgomery** has been appointed to the newly-created position of assistant to the vice-president and general manager.

George K. Garrett Co.—**J. Donald Clark** was named general manager and **George Nessenthaler** was made works manager of the firm's three plants.

Glenn L. Martin Co.—**Carl B. Allen,** writer, has been made special assistant to the president, and **Lawrence E. Chermak** has rejoined the legal staff.

Zenite Metal Corp.—**Brig. Gen. H. L. Mumma,** U. S. A., ret., was named executive vice-president.

Eastern Air Lines—**Harry B. Coen,** retired General Motors vice-president, has become a management consultant for the company.

Air-O-Matic Power Steer Corp. —**Henry Schneider** has moved up to board chairman while **George Wichman** replaces him as president. **Homer Gray,** former chief engineer, is now executive vice-president and a board member.

Boeing Airplane Co. — **Richard Nelson** was named production manager for the pilotless aircraft program, and **R. E. Bothell** is assistant to the manufacturing manager. **Lewis Daniels becomes** process coordinator, **Rex Delaware** is in charge of factory shops, and **Clyde Peterson** is tooling manager for the program.

Plymouth Div., Chrysler Corp.— **William J. Bird** succeeds **R. C. Summerville** as general sales manager.

Chrysler Div.—**E. C. Quinn** became president of the division today, following the retirement of **David A. Wallace.**

Bell Aircraft Corp.—**Maj. Gen. G. H. Olmstead** was reelected to the board of directors following his release from the service.

Ingersoll Products Div., Borg-Warner Corp.—Appointment of **R. B. Crean** as administrative assistant to the president has been announced. He formerly was vice-president of Baldwin-Lima-Hamilton Corp.'s Eddystone Div.

(*Turn to page* 170, *please*)

FASTEST THING IN FASTENINGS®

TINNERMAN

Speed Nut

SAVINGS STORIES

Champion

Name Plates
cars, stoves, refrigerators

Attaching clock movement
to plastic case over
D-shaped stud

Solenoid Caps

Oven Filaments
to oven liners

NEW Tinnerman Push-On SPEED NUTS®

...for wide range of applications

– PRICE SAVINGS AVERAGE 25%!

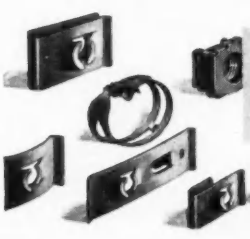
● Tinnerman, originators of Push-On type SPEED NUTS, offers this new C12000 Series at substantial savings! Large volume, high speed production, plus years of engineering and manufacturing experience make this economy possible! These new lightning-fast Push-Ons are available in a complete range of popular sizes, with rust-resistant finish, for round, D-shaped or rectangular studs. A unique feature, exclusive with Tinnerman Push-Ons, is their use over D-shaped studs where removability is desired.

Call or see your Tinnerman representative for full, cost-saving information about these new, low-priced Push-On type SPEED NUT brard fasteners.

NEW C12000 Push-On
SPEED NUTS

...are one-piece, self-locking, spring steel fasteners. Start by hand...zip down over integral studs, rivets, tubing, nails, any unthreaded parts; bite lock on smoothest, hardest surface!

Send today for copy of "Greater Savings Than Ever with C12000's"; also FREE Production Samples! Write: TINNERMAN PRODUCTS, INC., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners Ltd., Hamilton, Ontario. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S. A.—7 rue Henri Barbusse, Levallois (Seine).



TINNERMAN Speed Nuts®

MORE THAN 8000 SHAPES AND SIZES

COOLIDGE
BALLS
CHROME ALLOY
STAINLESS STEEL

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Finest:
ELECTRIC FURNACE STEEL
HEAT TREATMENT
LAPPED FINISHES

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THESE FACTORS COMBINE TO MAKE THE FINEST STEEL BALLS OBTAINABLE BECAUSE THEY CONTRIBUTE TO CLOSER SURFACE UNIFORMITY—BETTER STRAIN DISTRIBUTION—HIGHER LOAD CARRYING CAPACITY—LONGER LIFE

•

Used in:
BALL BEARINGS • AUTOMOTIVE • AIRCRAFT
FARM AND INDUSTRIAL EQUIPMENT
MACHINE TOOL • OIL WELL AND OTHER
IMPORTANT APPLICATIONS

•

COOLIDGE
CORPORATION
BOX 488 • MIDDLETOWN, OHIO

MEN *in the* NEWS

(*Continued from page* 168)

McCulloch Motors Corp.—**L. S. Peck** has joined the company as director of industrial relations. **N. A. Lamberti** is director of materials.

Douglas Aircraft Co.—**L. M. Spencer** has been appointed assistant to the vice-president—military sales.

Rosan, Inc.—**Jerry Hester** has joined the company as head of administrative engineering, **Glenn Aron** as engineering field representative, and **Richard Gifford** as chief test engineer.

Consolidated Vultee Aircraft Corp.—**D. T. Fisher** has been elected controller and **G. T. Bovee** was named treasurer.

Aerol Co.—**Howard D. Neal** has been appointed vice-president and general manager.

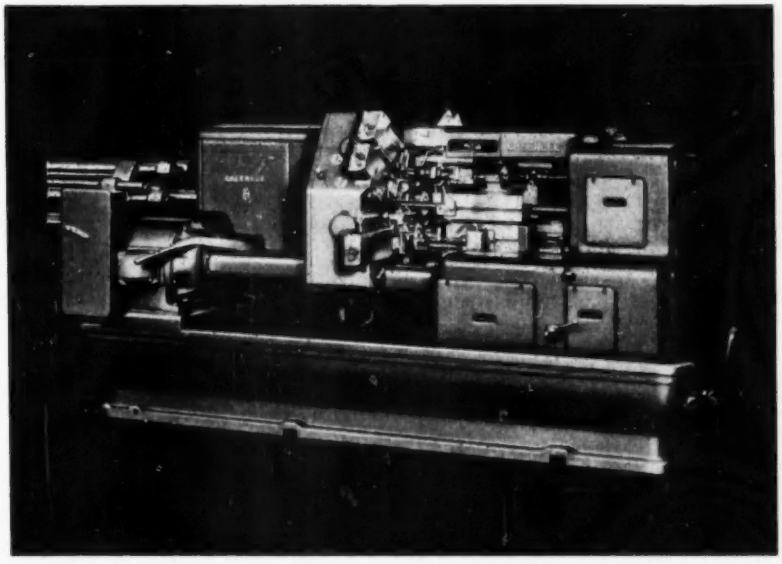
Harvill Corp.—**Richard B. Clevering**, formerly of the Allison Division, GM, was elected president of Harvill.

Pastushin Aviation Corp.—**Edward J. Horkey** has joined the company as vice-president in charge of engineering.

General Motors Corp.—**Robert A. Daily** has been named resident manager of the new Delco battery plant soon to be under construction at Anaheim, Calif.

Vehicle Export Sales Behind Last Year

Although factory sales of new motor vehicles for the first four months of this year was 41 per cent above the same period a year ago, export sales fell behind last year both in numbers and percentage of total output. According to AMA 123,988 cars, trucks, and buses were exported in the first four months of this year, representing 4.8 per cent of total factory sales of more than 2.57 million. During the same period last year export sales totalled 137,901 vehicles, or 7.5 per cent of total output. Foreign sales of passenger cars was up slightly from the first four months a year ago, numbering 75,600 compared with 72,516. Trucks, however, took a sharp drop to 48,301 units from 65,098 during the first four months of 1952, and account for the overall decline. Bus exports are up slightly, but total only 287 units.



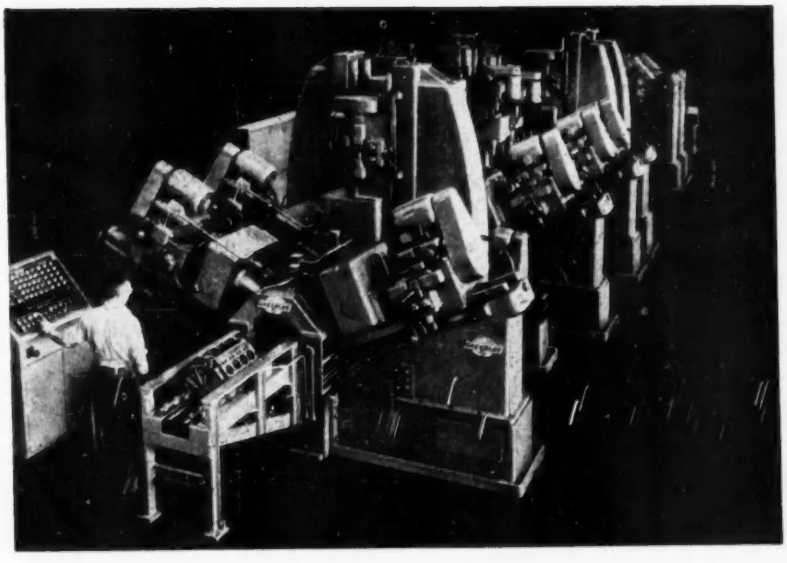
Greenlee Machines feature maximum economy of operation on short-run as well as long-run jobs . . . because of quick change-over, wide-open tooling area, great versatility, low tool cost, and a wide variety of accessories.

The Greenlee "Six" is available in 1", 1⅝" and 2" capacity — the "Four" in 1⅝" and 2⅝" capacity. This range covers the majority of all machine-shop needs.

Automatic Screw Machines

GREENLEE

Special Machine Tools



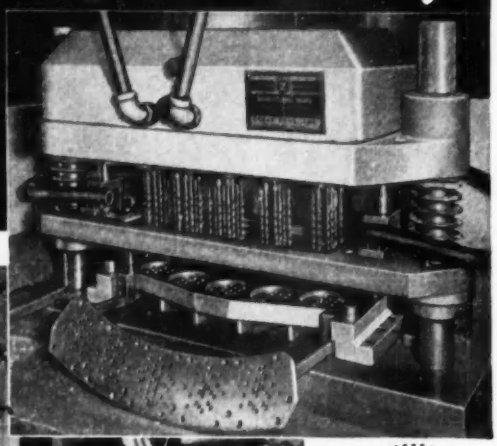
The first Greenlee "special" machine was designed and built in 1918, and Greenlee was also a pioneer in the development of automatic transfer machines now widely used in the mass-production industries. Greenlee machines are made up of *proved* units and mechanisms, specially combined to perform specific work . . . consequently, they show remarkably good performance right from the start of their operation.

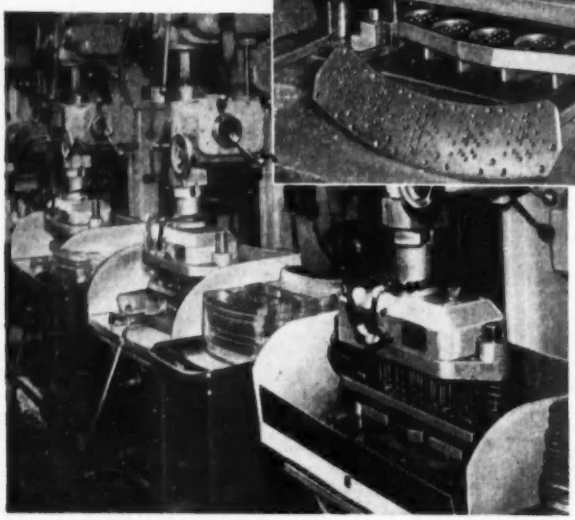
GREENLEE BROS. & CO.
1756 MASON AVENUE
ROCKFORD, ILLINOIS

GREENLEE

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

UNITED AIRCRAFT chooses *Zagar* engineered drilling for J-47 Jet Engine Parts





Zagar evolves best method for drilling 383 holes in header plates and manifold for liquid-to-liquid heat-exchanger. Photographs by courtesy of UNITED AIRCRAFT PRODUCTS, INC., Dayton, Ohio.

The job: to save most time and money in drilling 365 holes .200 diameter and 18 holes 5/16" diameter. Zagar *engineered drilling* licked it.

● You, too, can profit from the often demonstrated ability of Zagar gearless drillheads to drill hundreds of holes at one pass. Zagar's engineered drilling permits record-breaking performance without drill breakage. Used alone or combined into 4-post machines, Zagar gearless drillheads drill any material and any size hole on all centers as close as twice the drill diameter. No application is too difficult for Zagar standard machines 16", 24", 32" and 40", or for special machines to fit your needs exactly. All this, at a new low cost of tooling.

Ask for Zagar Catalog "U-6"

ZAGAR TOOL, INC.

24000 LAKELAND BLVD. • CLEVELAND 23, OHIO

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

CALENDAR

OF COMING SHOWS AND MEETINGS

Exposition of Basic Materials for Industry, Grand Central Palace, New York, N. Y. .....June 15-19

14th Iowa Management Course, State U. of Iowa, Iowa City. June 15-27

American Welding Society, National Spring Technical Meeting, Shamrock Hotel, Houston, Tex. June 16-19

General Management Conference, American Management Assn., Hotel Statler, New York, N. Y. June 17-19

British Empire Trophy Race, Isle of Man .....June 18

Motor Vehicle Fleet Supervision Course, Northwestern U. Traffic Institute, Evanston, Ill. ...June 22-26

Motor Fleet Supervisor Refresher Seminar, Northwestern U. Traffic Institute, Evanston, Ill..June 25-26

20th International Aeronautical Meeting, Le Bourget Field, Paris, France .....June 26-July 5

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J....June 29-July 3

Sixth Annual International Aviation Exposition, Detroit, Mich. ..July 9-12

SAE International West Coast Meeting, Georgia Hotel, Vancouver, B. C. .....Aug. 17-19

Western Electronic Show & Convention, Civic Auditorium, San Francisco, Calif. .....Aug 19-21

National Aircraft Show and 50th Anniversary of Powered Flight, Vandalia Airport, Dayton, O..Sept. 5-7

Society of British Aircraft Constructors' Display, Farnborough .....Sept. 7-13

SAE National Tractor Meeting and Production Forum, Hotel Schroeder, Milwaukee, Wis. Sept. 14-17

Eighth National Instrument Conference and Exhibit, Chicago, Ill. .....Sept. 21-25

Paris Salon, France .....Oct. 1-11

28th International Motor Show, Earls Court, London .....Oct. 21-31

American Society of Tool Engineers, semi-annual membership and board meeting, Dayton Biltmore Hotel, Dayton, O. .....Oct. 30-31

Montreal Materials Handling, Tool and Industrial Equipment Shows, Show Mart, Montreal, Que. .....Nov. 9-13

NATIONAL OIL SEAL LOGBOOK

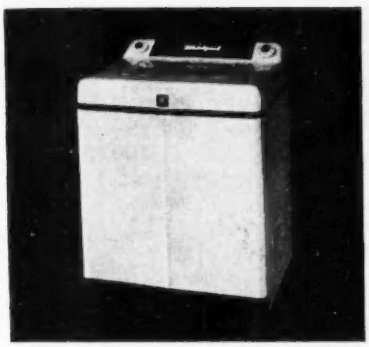
Write our Redwood City office for reprints of this Logbook page

Sealing News & Tips

Whirlpool seals a vertical oscillating shaft and simplifies installation with Syntech* seals

In the Whirlpool 501562 automatic home clothes washer, the agitator drive shaft is mounted in a vertical position within a rotating basket drive tube. Both are assembled within a steel center post rising through the washer tub. At four points near the top of this assembly (Figure 1) sealing is necessary to retain S.A.E. #40 oil and prevent contamination by water, detergent and lint. National Syntech* (synthetic rubber) seals are used at all four points.

At the top of the assembly, a National 240,000 Syntech (Figure 2) is mounted within the basket drive tube and seals the oscillating agitator shaft. Immediately below, a National 340,000 Syntech is mounted inside the center post to seal the O.D. of the basket drive tube. Farther down the assembly, two additional seals—again National 240,000 and 340,000 units—are installed to insure efficient lubricant retention. All seals are of springless design with



sturdy, long-lasting Syntech sealing members and a Syntech-covered O.D. The seals also have a rigid steel bonded inner member which simplifies assembly by insuring that the seals remain in position when the agitator shaft and drive tube are inserted.

National seals used in this washer are standard designs, available in a wide number of sizes. National has over 2,500 standard design rubber or leather seals. Possibly your seal requirements can be met from this large selection; perhaps special engineering is required. In either event, National Applications Engineers are at your service.

*T. M. Reg.

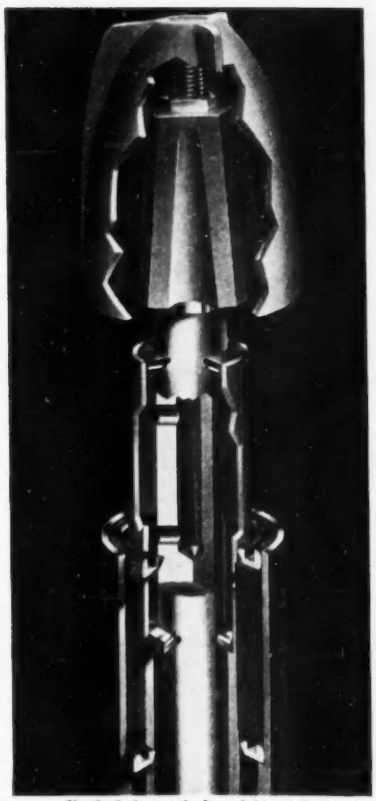


Fig. 1. Agitator shaft and drive tube

Fig. 2. National 240,000 Syntech

Fig. 3 National 340,000 Syntech

National 320,000 Syntech Seal

One of the many National Syntech designs. Spring-loaded synthetic rubber sealing lip for fluid or lubricant retention, integral with springless outer lip for exclusion of dirt, water, foreign matter. Rubber-covered O.D. to seal bore without gasketing cement. Rigid steel inner case.

National O-Rings

National, a world leader in oil seals, now offers a complete O-Ring line of consistent quality and uniformity . . . See your National Applications Engineer for full information, engineering and sales service. Or, write direct for the new National O-Ring catalog, most broadly useful brief compilation of O-Ring data offered. (Write on your letterhead, please.)

National Shims

National Shims are available in many sizes and shapes and all thicknesses from .001" up. Uniform density of metals employed prevents distortion under severe pressure. Used by all leading vehicle, equipment and machinery manufacturers. Request Catalog 39.

"Let Your Decision be Based on Precision"

NATIONAL
OIL & GREASE SEALS
O-RINGS SHIMS

NATIONAL MOTOR BEARING CO., INC.
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Plants: Redwood City, Calif.; Downey (Los Angeles County), Calif.; Van Wert, Ohio

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DETROIT, MICH. . . . . *726 Lothrop Avenue, TRinity 1-6363*
DOWNEY (Los Angeles Co.), CALIF. . *11634 Patten Rd., TOpaz 2-8166*
MILWAUKEE, WIS. . . *647 West Virginia Street, BRoadway 1-3234*
NEWARK, N. J. . *Suite 814, 1180 Raymond Blvd., MItchell 2-7586*
REDWOOD CITY, CALIF. . . *Broadway and National, EMerson 6-3861*
WICHITA, KANSAS . . . . *519 South Broadway, WIchita 2-6971*

made by
MASTER CRAFTSMEN
to insure
Matchless Performance

MASTER
SERVICE PARTS

WATER PUMPS
Lifetime-lubricated bearings. Patented long-life seals. Vacuum-tested.

CLUTCH RELEASE BEARINGS

Finest materials and workmanship assure less friction, longer wear.

TIE ROD ENDS
Four ways better! Rolled Threads, Phosphor Bronze Seat, Patented Ball Bearing Construction, Neoprene Washer and Dust Shield.

OTHER MASTER BRAND QUALITY PRODUCTS
Front End Suspension Parts • King Bolt Sets • Front Wheel Bearings
Hydraulic Brake Parts • Hydraulic Brake Hose • Stop Lite Switches
Fuel Pumps Parts and Distributors

WRITE FOR CATALOGS!
CHEFFORD MASTER
MANUFACTURING
COMPANY, INC.
Fairfield, Illinois

Hottest "500"

(*Continued from page 39*)

for cradle mounted applications; and composite rubber construction (similar to aircraft rubber cells or bags) for cradle mounted tanks. Fiberglas protective coatings were applied in some cases to both steel and aluminum tanks. Fuel capacities varied considerably from car to car but 50 to 60 gallons was the average.

The Firestone company, after extensive testing of wide-base rims and larger tires, this year supplied rear tires with a nominal section of eight in. These wider tires were credited with a substantial improvement in holding qualities or "bite." In many cases they adhered so much better than the tires previously used that it was necessary to change to a lower final gear to hold the desired engine speed. Seven in. base rims were used with these tires.

It seemed, at least to this reporter, that the shock absorber brigade had more spare time this year than usual but it may have been due to the ravages of scuffed and scored pistons (referred to in another paragraph) as much as to any purpose or design. The Monroe people were again on the job and most cars were equipped with their telescoping shocks. The 500-B Kurtis-Kraft are built with Monroes, as well as rotary types, as standard equipment. The smaller cars, such as the Kurtis-Kraft 4000's, stick mainly to the rotary shocks for space reasons. The 500-A's were built with both. The few 3000's in the race had both in some cases.

Nitro-methane, or "pop" as it is known to the cognoscenti of the racing profession, came into the open this year when a move was made by numerous car owners to have its use banned on grounds involving safety. The move failed, however, when it was found impossible to obtain waivers from each entrant for establishing such a ban. Net result of the movement undoubtedly was to encourage, or at least stimulate, the use of "pop" in more cars than ever. This, according to our observations, was particularly true of qualifying activities. The stuff was used and, in most cases, was effective in boosting the user into "safe" qualifying brackets.

Reliable information on the technique of employing "pop" is scarce and guarded. Putting several stories together for an average, a typical nitro-methane approach consists of

. . or Released in an Instant

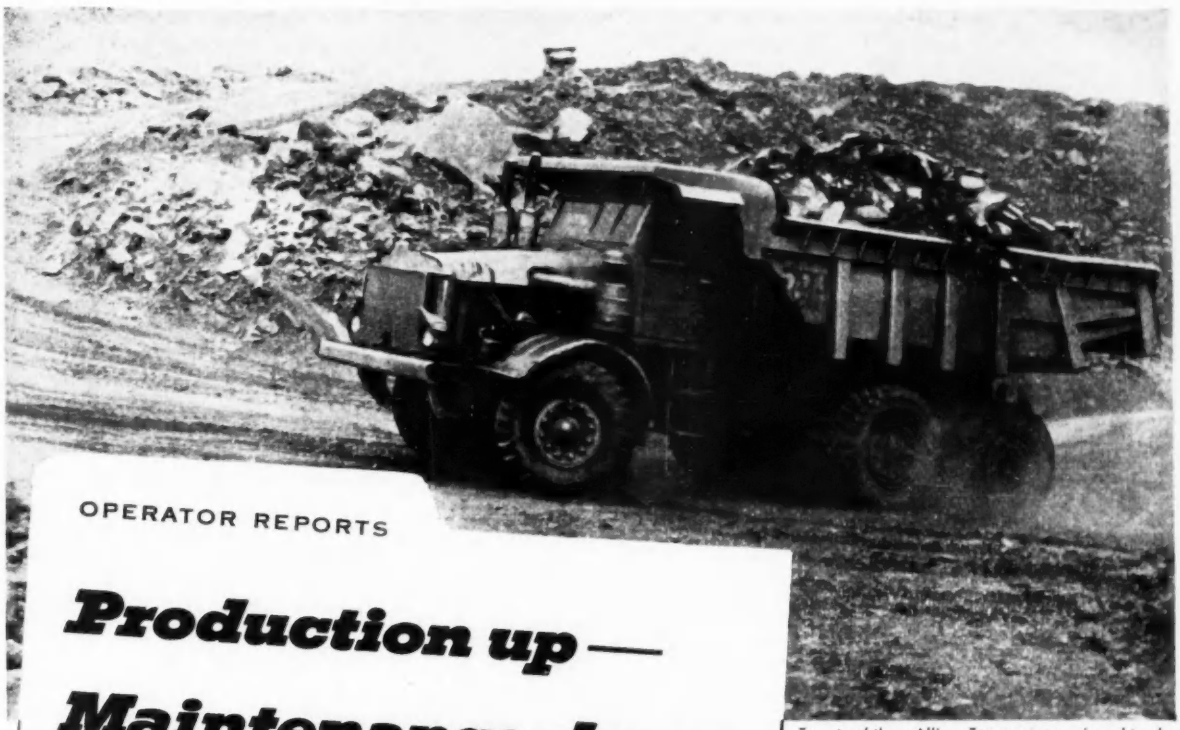
Faster assembly . . . no more failures of fasteners. GREER STOP NUTS hold firm against jolts, shocks, shimmy, wobbles . . . any vibration, any kind.

Bolt threads are gripped tightly . . . these famous nuts *never* work loose. Yet an ordinary hand wrench gives instant release. The tough, built-in GREERCOID collar does it . . . and seals against fluid leakage, too!

Study *your* fastener problem. Over 3000 types and sizes. Consult GREER. Proved on thousands of products. Meets gov't and military specifications.

Write
GREER STOP NUT CO.
2620 Flournoy, Chicago 12, Ill.

GREER
Stop Nuts



OPERATOR REPORTS

Production up — Maintenance down

Twenty of these Allison TORQMATIC-equipped trucks are working 21 hours a day hauling 34-ton pay loads of coal and overburden over 7½% grades.

The Wadesville Production Company operates 20 Allison TORQMATIC-equipped Euclid rear-dump trucks hauling 42,000 tons daily in its strip mine near St. Claire, Pa. These trucks boost production by making round trips 25% faster than the mechanical-drive units they replaced.

This operator's records show TORQMATIC DRIVES outlast mechanical drives — maintenance time and costs are down too. At routine overhaul periods, mechanics change out the TORQMATIC DRIVES in 2 hours less time than they change out a mechanical drive.

You, too, can cut your heavy-duty equipment operating costs by specifying Allison TORQMATIC DRIVES the next time you buy. Ask your equipment dealer, manufacturer or write:

ALLISON *Division of* GENERAL MOTORS
Box 894AA, Indianapolis 6, Indiana

ALLISON TORQMATIC DRIVES

Unbeatable Team for Maximum Operating Economy

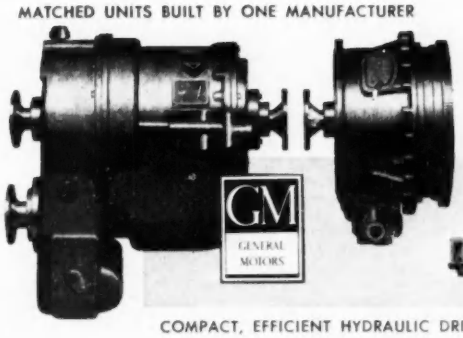
**Quick-shifts* at full throttle with finger-tip hydraulic control.

**Holds* power to load at all times — no clutch pedal to push — no gearshift guess.

**Cuts* maintenance cost by absorbing shock — eliminates engine lugging — prolongs equipment life.

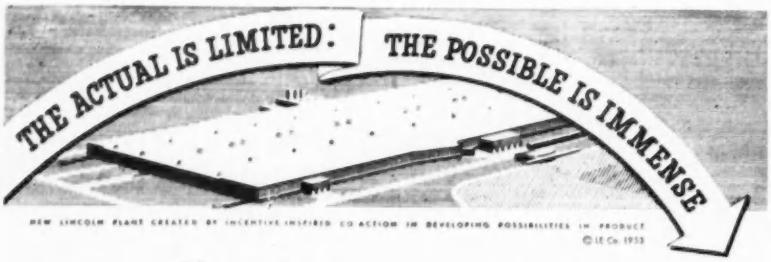
**Only* torque converter-transmission team designed to work as a unit and built by one manufacturer.

MATCHED UNITS BUILT BY ONE MANUFACTURER



Allison TORQMATIC DRIVES

COMPACT, EFFICIENT HYDRAULIC DRIVES FOR CRANES * TRUCKS * TRACTORS * SHOVELS * SCRAPERS * DRILLING RIGS



NEW LINCOLN PLANT CREATED BY INCENTIVE INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT
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AUTOMATIC LINCOLNWELD SPEEDS PRODUCTION

INCREASES FRAME STRENGTH, RIGIDITY

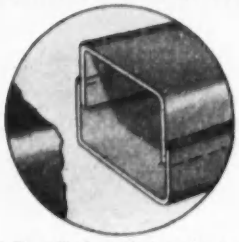

Fig. 1. Two U-shaped stampings *of hot rolled carbon steel are automatically welded into frame side rails. Speed . . . 36 seconds. Only two operators required per machine for complete operation.*

Fig. 2. Completed frame assemblies *are twisted and vibrated severely to test strength of machine welds. No fracture of welds has ever occurred.*

HERE'S HOW

OUTPUT INCREASED 5 TIMES WITH AUTOMATIC LINCOLNWELD

AUTOMATIC welding of automobile frame side rails has increased output by 5 times. Four automatic Lincoln machines now weld 80 rails per hour at the Frame Division, Murray Corporation of America, Ecorse, Michigan.

Each machine has 6 Lincoln "hidden-arc" heads which weld at speeds of 120 inches per minute. Entire operating cycle per rail is only 36 seconds. All operations, including welding, clamping, feeding of wire and flux, tracing and slag removal, are fully automatic. After welding, the heads retract and the assembly is kicked out by ejector pins.

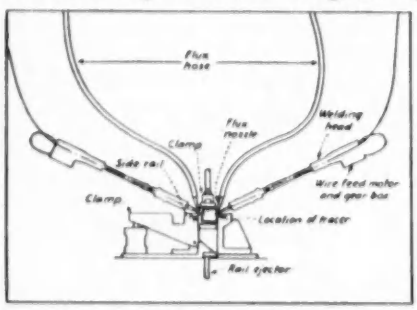

Fig. 3. Automatic "hidden-arc" welding *heads move into position after side rail is clamped. Heads guided along seams by tracer and contour compensating device for 1/16" alignment of wire and joint.*

Welding speed is increased 400% over previous manual welding. Controlled time cycle and uniform heat input keep frames within 1/8" end tolerance—less than possible with hand work. Cratering is eliminated. Entire operation uses only 25% of floor space previously required.

GET THE FACTS! *Latest data on procedures and speeds with Automatic Lincolnweld are available in Bulletin 439. Write on your letterhead to Dept. 2202.*

THE LINCOLN ELECTRIC COMPANY
CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

approximately 10 per cent nitro; two per cent (or less) oil of wintergreen; one per cent (more or less) castor oil; one per cent (more or less) water; five per cent benzol (or acetone in some instances); the remainder methanol. This concoction is said to be safe for compression ratios up to 10 or 12 to 1. Where lower ratios are available the percentage of "pop" sometimes goes to 20.

Grateful acknowledgment is hereby made to Messrs. Powell, Silberman, and Rigsbee, officials of the AAA Technical Committee and Timing and Scoring Group, respectively, for cooperation received in the preparation of this report.

BOOKS . . .

CARBURETOR OPERATION AND MAINTENANCE MANUAL, *published by United Motors Service, 3044 West Grand Blvd., Detroit, Mich. Price, $1.50.* This book contains basic data for the operation and maintenance of all late model carburetors manufactured by Rochester Products Div., General Motors Corp. After the first chapter on basic principles of carburetion, each succeeding chapter is devoted to a particular Rochester model. Operation on the carburetor systems, disassembly and assembly procedures, cleaning and inspection of parts, and adjustment methods are discussed in detail. The purposes of each adjustment, car applications, repair and gasket assortments, as well as necessary special tools and gages, are also discussed.

ASTM SPECIFICATIONS FOR STEEL PIPING MATERIALS, *published by American Society for Testing Materials, 1916 Race St., Phila., Pa. Price, $3.75.* The ninth edition of this compilation, sponsored by Committee A-1 on Steel, contains in latest approved form the 56 widely used ASTM specifications for carbon-steel and alloy-steel pipe and tubing, including stainless. Materials covered include: pipe used to convey liquids, vapors, and gases at normal and elevated temperatures; boiler, superheater, and miscellaneous tubes; still tubes for refinery service; heat-exchanger and condenser tubes. To make the volume more complete there are also included specifications for the following materials used in pipe and related installations: castings; forgings and welding fittings; bolts and nuts. The ASTM standard classification of austenite grain size in steels (E19) with two sets of charts; also the American Standards covering wrought steel and wrought iron pipe (B36.10) and stainless steel pipe (B36.19) are a part of the 394-page book. New specifications cover: quenched and tempered alloy steel bolts and studs with suitable nuts; electric-fusion-welded austenitic chromium—nickel alloy steel pipe for high-temperature service; iron-chromium and iron-chromium-nickel alloy tubular centrifugal castings for general applications. The grade designations in all tubular specifications, as well as specifications covering forgings used in conjunction with pipe at high temperature have been reviewed and correlated.

Giants of long ago had plenty of strength but too much weight to make them 100% efficient. Modern industrial might is measured in strength, too, but weight must be kept at an absolute minimum.

In order to give you all the strength you need to meet the casting requirements of the transportation, manufacturing and military fields, *plus extremely light weight,* we have developed FRONTIER 40-E Aluminum Alloy. You'll find this non-heat-treated alloy has excellent machineability, superior shock and corrosion resistance and pressure tightness — all qualities that assure you the production results you're looking for. In addition, there's *test bar uniformity* throughout large castings!

Find out how FRONTIER 40-E can help your product gain giant stature in its field.

WRITE for FREE DATA BOOK and full details on FRONTIER 40-E Aluminum Alloy.

Remember — if ALUMINUM can do it better — FRONTIER 40-E ALUMINUM ALLOY can do it Best!

FRONTIER BRONZE CORPORATION

4885 PACKARD ROAD, NIAGARA FALLS, NEW YORK

Reflectoscope TESTING

is available in your plant...

AS YOU NEED IT!

SPERRY INSPECTION SERVICE now makes fast, dependable, non-destructive testing available for every plant. You can have an experienced inspection engineer using a Sperry Reflectoscope — when you need them — for any desired length of time from four hours up.
Practically every type of material can be tested; hidden defects are quickly and reliably located in up to 30 feet of solid steel. Parts may be checked without dismantling. Write now for complete information.

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☐ Please put me on your mailing list for Industrial Application Reports.
☐ Have a SPERRY Representative drop in when in the area.

MATERIAL TO BE TESTED_____
NAME_____
TITLE_____
COMPANY_____
CO. ADDRESS_____
CITY_____
ZONE_____ STATE_____

Industry News

(*Continued from page* 164)

Aluminum Contract Set

First government contract signed in the long-discussed third round of aluminum production facilities expansion is the new agreement between General Services Administration and Harvey Machine Co., Inc., Torrance, Calif.

GSA will have a five-year option to buy at market price total production of primary metal to be turned out by Harvey at or near The Dalles, Ore. The company will build a two-potline reduction plant with an annual capacity of 54,000 short tons per year. It also will construct an alumina plant with a capacity large enough to supply the reduction facility.

Government purchasers must notify Harvey in advance as to the amount of total output the U. S. intends to buy. In the first 5 years of operation, two-thirds of the total, less the amount the government wants, must be offered to non-integrated users. During the next 15 years, Harvey must offer a flat 25 pct of its production to non-integrated firms.

No similar purchase contract has been signed with either Olin Industries, Inc., or the Wheland Co., of Chattanooga, Tenn., both of which have obtained fast tax writeoff certificates to permit entry into the primary aluminum field. These firms have figured prominently in the third-round expansion goal, set at 200,000 tons of new capacity.

Meet on Quality Control

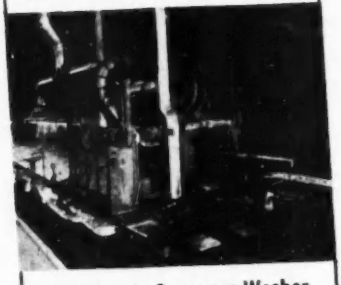
Latest methods of quality control as applied to a wide variety of products were discussed at the many technical sessions which featured the 7th Annual Convention of the American Society for Quality Control, held in Philadelphia May 27-29. Approximately 43 manufacturers of quality control equipment displayed their products at the exhibition which was held during the three days of the convention. Attendance was at an all-time high with registrations exceeding 2500.

New officers of the society were installed during the convention. Alfred L. Davis, director of public relations at the Rochester Institute of Technology, Rochester, N. Y., was elected national president of the ASQC. The three new vice-presidents are: Raymond S. Saddoris, quality manager, A. O. Smith Corp.; Dr. Julian H.

(*Turn to page* 180, *please*)

productive
WASHER
installation
#2796

INSTALLATION #2796
FORD



Metalwash Conveyor Washer, one of two in series, performing final wash before engine assembly at FORD MOTOR COMPANY ENGINE PLANT, CLEVELAND, OHIO.

METALWASH ENGINEERING EXPERIENCE IS YOUR ASSURANCE OF LASTING PERFORMANCE

For further information about Metalwash Industrial Cleaning Machinery, please write for free illustrated catalog describing our complete line of standard and custom engineered machinery for washing, pickling, drying.

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DO YOU NEED *"Special"* FASTENERS

Why not use National's Special Product Service? It's sure to save you time and money in duplicating special fasteners you may now be using, or in designing and producing entirely new ones.

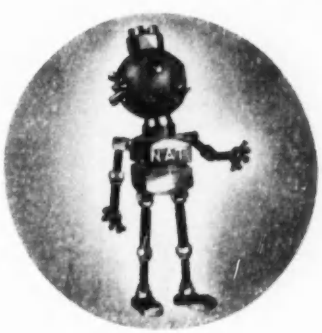
National engineers can help you find the solution to practically any fastener problem, and National's extensive production facilities with more than 3500 cold-heading and finishing units can produce your specials economically and in unlimited volume.

And, if you have small parts that may be adaptable to cold-heading production, you may find unusual cost-cutting possibilities by letting National's Special Product Service study them.

Send us your samples or specifications, or call the National representative nearest you. And remember . . . National makes the most complete line of standard fasteners and specialties such as lock nuts and self-locking bolts and screws.

Representatives in: Chicago, Cincinnati, Detroit, New York, Philadelphia, Kansas City, Denver, San Francisco and Seattle. Write or call direct to:

THE NATIONAL SCREW & MFG. COMPANY
Cleveland 4, Ohio
Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 22, Cal.

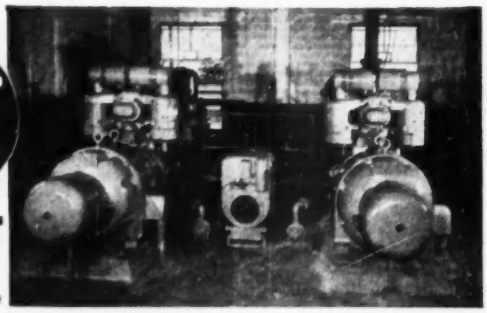


National PRODUCTS

FASTENERS HODELL CHAINS CHESTER HOISTS

Power TO FIT THE JOB

Power TO FIT THE MACHINE



Starting Power Is Important...

***provided by a* WISCONSIN HEAVY-DUTY *Air-Cooled* ENGINE**

Big diesels deliver standby power protection at this Florida refrigerated citrus warehouse . . . one of the largest in the South. But every bit as *vital* is the role of the 4-cylinder Wisconsin Heavy-Duty Air-Cooled Power Unit. *It starts the diesel, if electric power fails.*

Wherever there's a 3 to 36 hp. assignment, you can look for and usually find a Wisconsin Engine delivering dependable power to fit the job and the machine. Wisconsin Engines offer *the widest margin of usable power.* These engines *deliver* and *hold* the horsepower shown on the horsepower curves. Heavy-duty construction and service features, plus easy, positive starting, fool-proof air-cooling and thrust-absorbing tapered roller bearings at both ends of the crankshaft *add up* to reliability *plus.*

Complete your data file with facts about full line of WISCONSIN 4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 36 hp.

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 46, WISCONSIN

Norgren **MICRO-FOG LUBRICATORS**

RELY ON

ACE PRECISION

NYLON BALLS

FOR EXACT CONTROL

SIZES 1/8" – 3/4"
TOLERANCES ± .00

C. A. Norgren Co., Denver, Colorado, uses Ace Nylon Balls as feed tube checks in Micro-Fog Lubricators to provide instant oil flow.

Ace Nylon Balls of DuPont Nylon FM #10001 are mass produced to close tolerances giving you the advantages of toughness at low temperatures, form stability at high temperatures, light weight, chemical and abrasion resistance.

Hundreds of Industrial Applications! Let our engineers advise you.

Request samples and bulletin TODAY.

ALL HIGH QUALITY

ACE PLASTIC COMPANY

Precision Plastic Fabricators

91-46 VAN WYCK EXPWAY • JAMAICA 2, N. Y.

Industry News

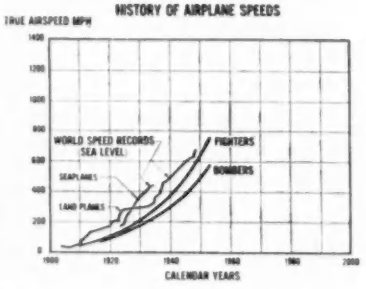
(*Continued from page* 178)

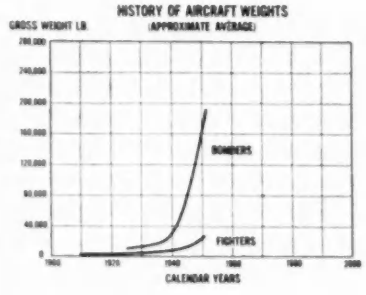
Toulouse, chief engineer, quality and specifications department, Owens-Illinois Glass Co.; and Paul A. Robert, assistant quality manager, International Business Machines Corp.

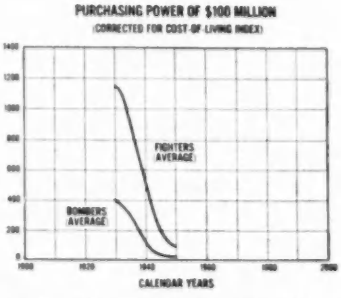
Magnetic Alloy

A method of producing a magnetic sheet composed of non-critical metals has been revealed by the Naval Ordnance Laboratory. The material, called 16-Alfenol, is a 16-Al-84Fe alloy. Cold worked sheets as thin as 0.0003 in. were produced.

AIRPLANE SPEED, COST, AND WEIGHT HISTORY







The above figures are from a paper "Airplane Weight and Cost Can Be Reduced" by E. H. Heineman, chief engineer, Douglas Aircraft Co., which was presented to the Washington Section of the Institute of the Aeronautical Sciences.

get a better job done

with

Mor-Speed

save time

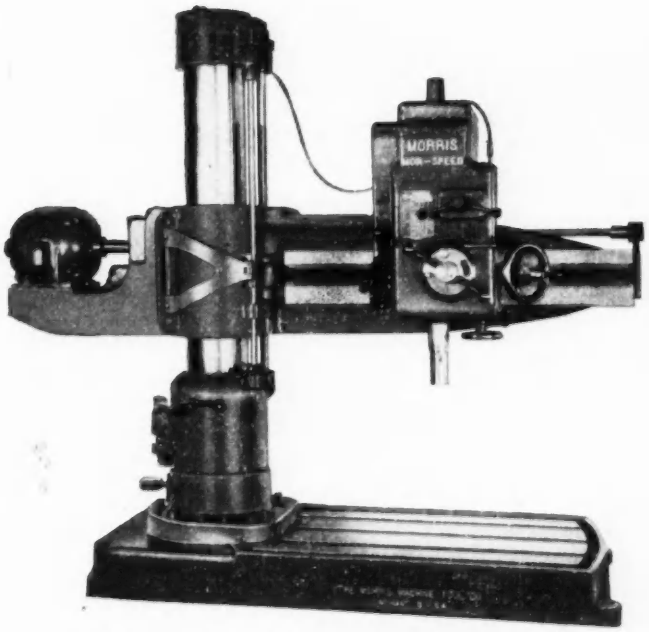
with completely centralized controls . . . instant selection of proper speed, feed; easily set automatic stops and trips.

with safety and dependability

tested safety devices safeguard machine, worker, workpiece . . . automatic lubrication protects built-in precision.

with lasting accuracy

alloy steels . . . modern hardening . . . . extra anti-friction bearings, all assure minimum wear and low cost service.



9" Column Standard and Heavy Duty Models (with 3 and 4-foot arms)

11" Column Heavy Duty Model (with 3, 4, 5 and 6-foot arms)

Morris MOR-SPEED RADIALS

Whether for production or tooling MORRIS Mor-Speed RADIAL DRILLS give you fast, easy operation with accuracy so essential in holding down costs. Write for bulletin #59. Early deliveries available.

THE MORRIS MACHINE TOOL COMPANY
938 HARRIET ST. CINCINNATI 3, OHIO

Morris

"A Better Product at Less Cost with PRECISION PLUS PRODUCTION."

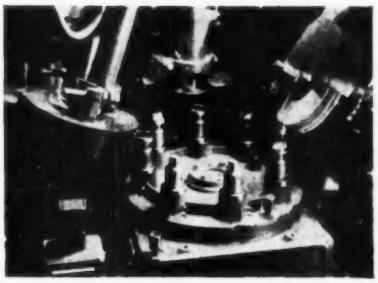
OSBORN

try this team for lower costs

Push-button brushing methods do jobs *better* and many times faster than by hand. For example:

Machine-powered Osborn Brushes are deburring parts 4 to 10 times as fast as hand methods. They are giving similar mass production benefits in cleaning and finishing operations of all kinds. Results are of uniform high quality. Rejects are practically nil.

Whether your product is metal, rubber, plastic or other material, ask to have an **O**sborn **B**rushing **A**nalyst study your operations to suggest improvements with the latest Osborn power brushing techniques. Call or write *The Osborn Manufacturing Company, Dept.* **E-6,** *5401 Hamilton Avenue, Cleveland 14, Ohio.*



HERE, three different types of Osborn brushes team up to boost deburring output of small parts 300% and to produce smoother, more uniform results.

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

YOUNGSTOWN
Cold Finished
CARBON AND ALLOY STEEL BARS
Uniformly satisfactory in service because—
Machinability is outstanding
Tolerances are uniformly close
Metallurgical characteristics are rigidly controlled

QUALITY V YOUNGSTOWN SERVICE

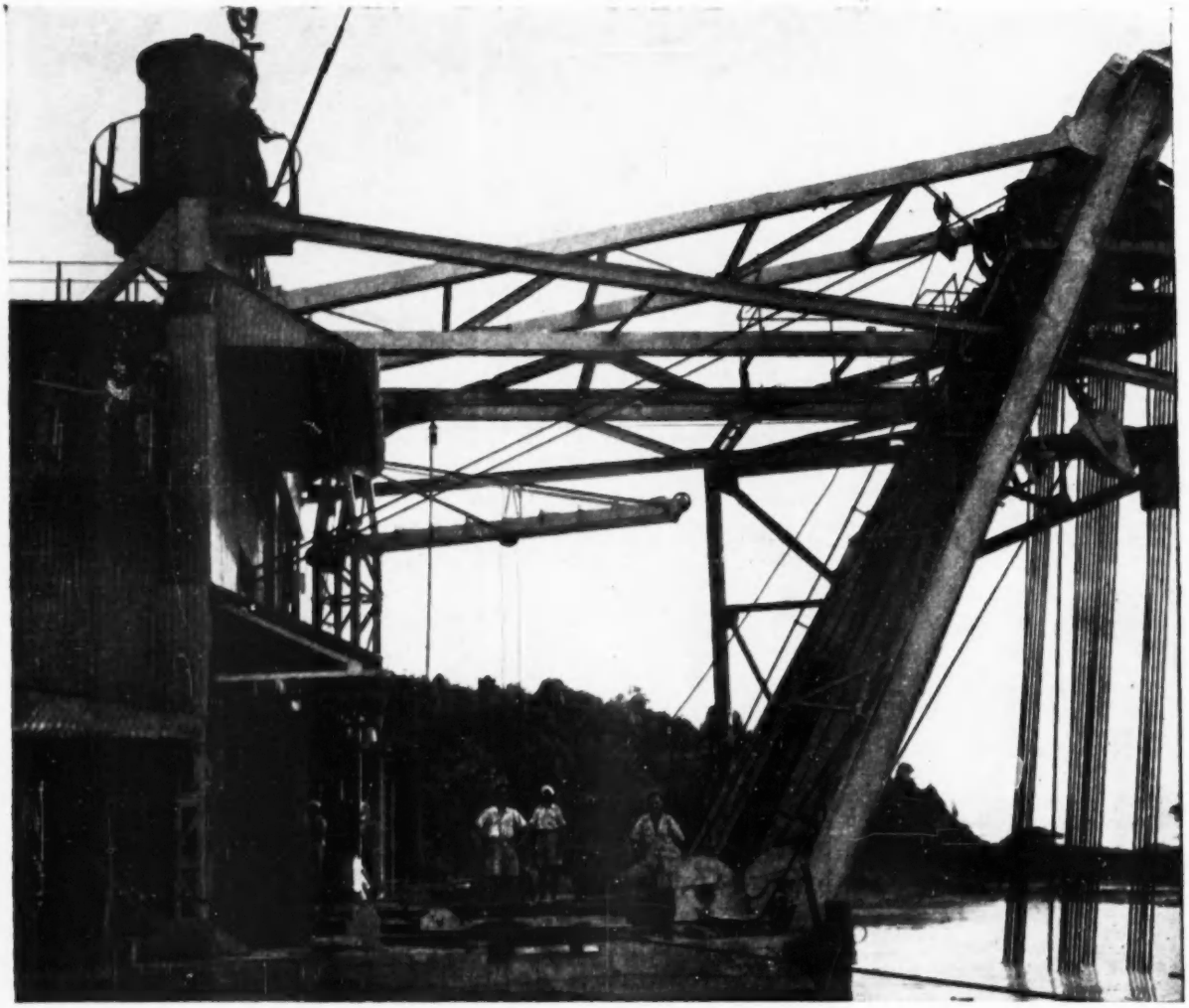
FOR TOP QUALITY BARS

●ALL steel for Youngstown Cold Finished Bars is of predetermined analysis—produced in the open hearth by closely controlled blending and refining of raw materials. Rigid control from ore to finished product results in uniform dependability.

Youngstown Cold Finished Carbon and Alloy Steel Bars are furnished in standard shapes and sizes, in either coils or straight lengths. For further information, phone or write our nearest District Sales Office.

Youngstown COLD FINISHED CARBON AND ALLOY STEEL BARS

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*
General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.
PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES



Here is the start of a Diesel locomotive

This complicated looking rig is part of a Malayan tin dredge.

Right here, in the heart of Southeast Asia, Diesel locomotives start off on the right track, for tin plays an important part in the manufacture of these modern giants. And over a third of the world's tin is mined in Malaya.

Tin is just as important to the engineer seeking ways to improve many a product.

Tin-zinc plating, for example, is an excellent and economical substitute for cadmium in many applications.

Phosphor bronze, another tin alloy, has uses ranging from iron lungs to foghorns.

In the field of chemistry, tin is increasingly important. Tin oxide is the best opacifier of enamel. Organotin compounds are the best stabilizers known for polyvinyl chloride plastics.

Thus tin is becoming continually more valuable as a modern industrial material.

With the end of U.S. Government controls, tin is again freely available in this country to *any* user, in *any* quantity, for *any* purpose, and an adequate supply for the future is assured. Geologists say no end is in sight to the important tin reserves in Malaya.

So take a good, long look at tin in your own product research and development. Remember, no other metal combines all the properties of tin. Tin is inert, nontoxic, friction and corrosion resistant. Tin is highly malleable, second only to gold. Above all, tin is economical to use. A little tin will do a lot of work.

This is the time to investigate thoroughly the ways it can work for you.

This Bureau is sponsored by the tin producers of Malaya to promote better understanding between America, world's largest consumer of tin, and Malaya, world's largest producer.

TIN NEWS, issued monthly, covers noteworthy current developments in the production, use and marketing of tin. Write for a free copy.

THE MALAYAN TIN BUREAU Dept. 404, 1028 Connecticut Ave., Washington 6, D.C.

"A Triple play BY RB&W REALLY SAVED US PLENTY!"

"It took us by surprise," Al went on, "when an RB&W man told us* he could speed up assembly of this precision screw-and-clamp unit and save us money besides. We figured we'd been doing O.K. the old way."

"What was the old way?" asked Mac, who'd recently started in at the shop.

"Well, it was a one-two-three operation. We used to machine the slotted-head screw for the clamp on that machine over there. Then we'd make a special collar, and fit it around the screw head to prevent the screw-driver from slipping out of the slot while the clamp was being applied or adjusted.

"What RB&W did was to cold-form the whole thing—screw, slot and collar—all in one piece. Wasn't an easy job, either—they had to strike a slot in the screw head and form the collar at the same time. Now we're saving one-third on our previous assembly costs—along with the price of the special collar."

Which proves that you can generally cut costs, if you look hard enough . . . even in such simple things as fasteners. It also underlines the creative approach to fastening problems you can expect from RB&W, as well as practical experience in designing and fabricating. If the fastener you need can't be supplied from our extensive stock, we'll study your assembly operation and make the right one for the job.

Remember—for any fastening operation, it's a smart move to call in RB&W. You can count on RB&W bolts, nuts, screws and rivets for uniform accuracy, dependability and physical properties. And you can also count on fast service from RB&W's strategically located plants at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Pittsburgh, Detroit, Chicago, Dallas, San Francisco. Sales agents at: Portland, Seattle. Distributors from coast to coast.

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

2.12

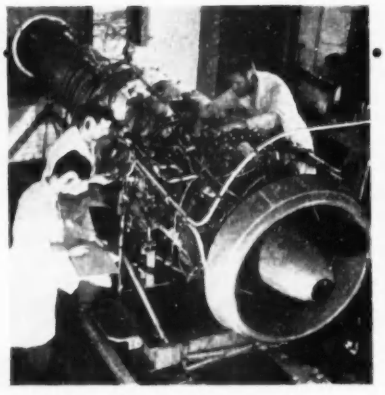
*George K. Garrett Co., Philadelphia, Pa.

RB&W 108 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

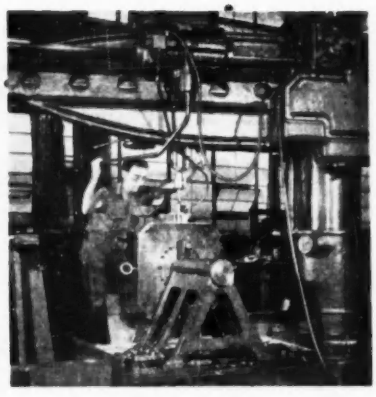
MAKE IT ALLOY

Versatile, dependable Chromium Steels are doing more different jobs today than ever before.

Constructional Alloy Steels—For greater strength and hardness in crankshafts, springs, transmission gears, countershaft pins, sway eliminator bars, through-hardened bearings and other critical parts, much of the alloy steel used by makers of automotive and farm equipment now contains chromium.



Stainless Steels—Every well-known type of stainless—both straight chromium grades and chromium-nickel grades — owes its resistance to heat and corrosion primarily to chromium.



Tool Steels—Whether for cutting, hot and cold forming, or die casting, whether the end product is a hand chisel or a forging die, nearly every present-day type of tool steel gets much of its strength and hardness from chromium.

The finest alloy steels are made with Vancoram ferro alloys.

VANADIUM CORPORATION OF AMERICA

420 Lexington Avenue, New York 17, N. Y.

DETROIT • CHICAGO • PITTSBURGH • CLEVELAND

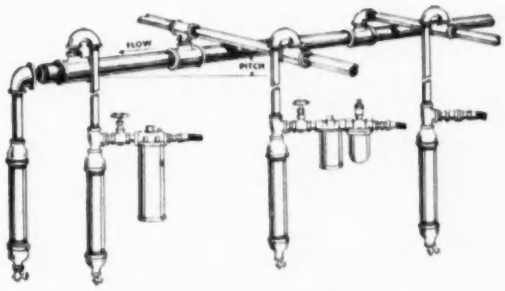
Make it better...make it alloy

VANCORAM

Producers of alloys, metals and chemicals

HANSEN REPRESENTATIVES
Quick-Connective Couplings
Are Their Business
BUT SO ARE FLUID LINE PROBLEMS

To Avoid Air Line Troubles



...use the on-the-job know-how of the HANSEN Representative

By the very nature of his job, the Hansen representative is thoroughly familiar with practically every type of air line hook-up. He knows what works—and why it does. Frequently, the remedy for your difficulties, drawn from his experience in dozens of plants, is very simple.

When you need help over the rough spots—either when actual troubles arise, or when air line circuits are being planned or altered—give him a call. Believe us, you'll welcome the help that he can give you.

GEORGE W. WARDEN
Geo. W. Warden Co., Seattle
Maintains close contact with fluid line installations in plants throughout Pacific Northwest.

EDWARD BURKE
The Burke Co., San Francisco
Offers years of practical experience in handling of vacuums, compressed air, gasses and liquids. Author of engineering manual on aircraft hydraulics.

CHESTER CAUGHRON
Chester Paul Co., Glendale
Supplies pneumatic and hydraulic equipment to practically every type of industry in the thriving Southern California area.

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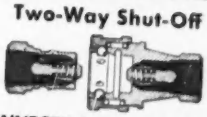
QUICK-CONNECTIVE FLUID LINE COUPLINGS

1. QUICK CONNECTION AND DISCONNECTION **2. INSTANT AUTOMATIC FLOW OR SHUT-OFF**

One-Way Shut-Off

Two-Way Shut-Off



ALSO STRAIGHT-THROUGH QUICK-CONNECTIVE COUPLINGS
Send for Catalog!

THE HANSEN MANUFACTURING COMPANY
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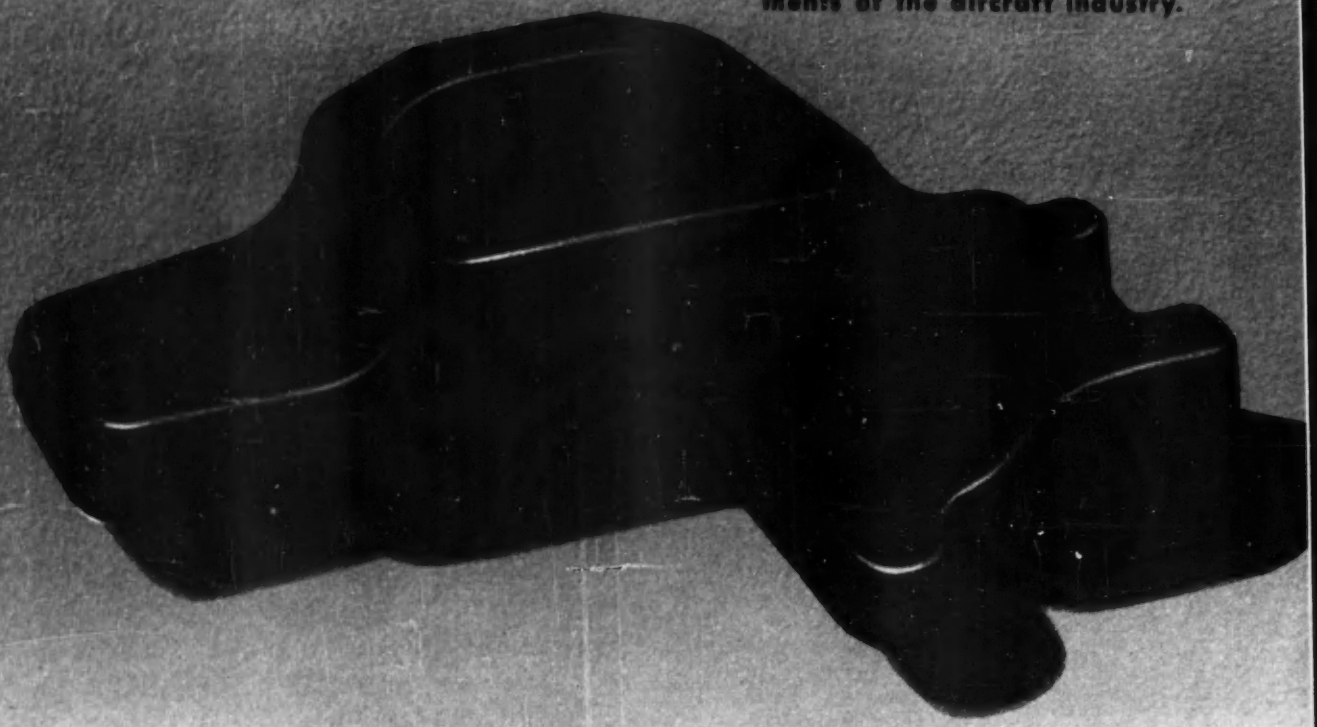
TRANSUE FORGINGS

USUALLY COST LESS AT THE POINT OF ASSEMBLY

Aircraft forging weighs 29 lbs. This forging is typical of T & W ability to produce the exacting requirements of the aircraft industry.



Consult our engineers when you are contemplating conversion to forgings or when you are in need of reliable forging service.

TRANSUE & WILLIAMS

STEEL FORGING CORPORATION • ALLIANCE, OHIO

SALES OFFICES: NEW YORK • PHILADELPHIA • CHICAGO • INDIANAPOLIS • DETROIT • CLEVELAND

OVER 50 YEARS OF FORGING PRODUCTION EXPERIENCE

AHLBERG
•Rugged Deep Groove Races of Chrome Alloy Electric Furnace Steel
•Large Micro-Lapped Chrome Steel Balls—Matched in Sets Within .000025"
•Lip-Type Balanced Retainers —Maximum Rigidity and Strength —Longer Life
AHLBERG
PRECISION-reared BEARINGS
Engineered and Built for the World's Finest Equipment
Automotive • Armament

Put the X-ray on today's most modern equipment and you'll see Ahlberg Ball Bearings doing an exceptionally wide variety of load carrying tasks vital to smooth, efficient and economical operation. Because they are "job-engineered" for the duties they perform, you'll find them assigned to key positions in aircraft, all types of on-and-off-the-road motor vehicles, marine, mining and all kinds of industrial equipment.

If you are having bearing problems . . . need a better, more dependable supply source, get in touch with Ahlberg—the mid-west's leading radial ball bearing manufacturer. If you decide to try Ahlberg Bearings, you will soon learn what so many of America's foremost manufacturers have known for over four decades—Ahlberg quality is something you can take for granted. Your inquiry will receive prompt attention.

AHLBERG BEARING COMPANY, 3025 West 47th Street, Chicago 32, Illinois

Equipped with **Donaldson**

ALUMINIZED-STEEL muffler!

the revolutionary MM UNI-SYSTEM of farming

ALUMINIZED-STEEL is a sheet of steel coated with aluminum. Molten aluminum is applied directly to the steel by a patented process and the finished product, coated on both sides, combines the surface characteristics of aluminum with the mechanical and physical properties of steel. The two metals together resist the combination of heat and corrosion *far better than the aluminum coating or steel alone.*

A self-propelled combine, a two-row corn picker, a picker-sheller, a forage chopper . . . that's the Minneapolis-Moline Uni-Harvestor! One specialized Uni-Tractor is the power source for all these interchangeable Uni-Harvestor attachments . . . and there are more to come!

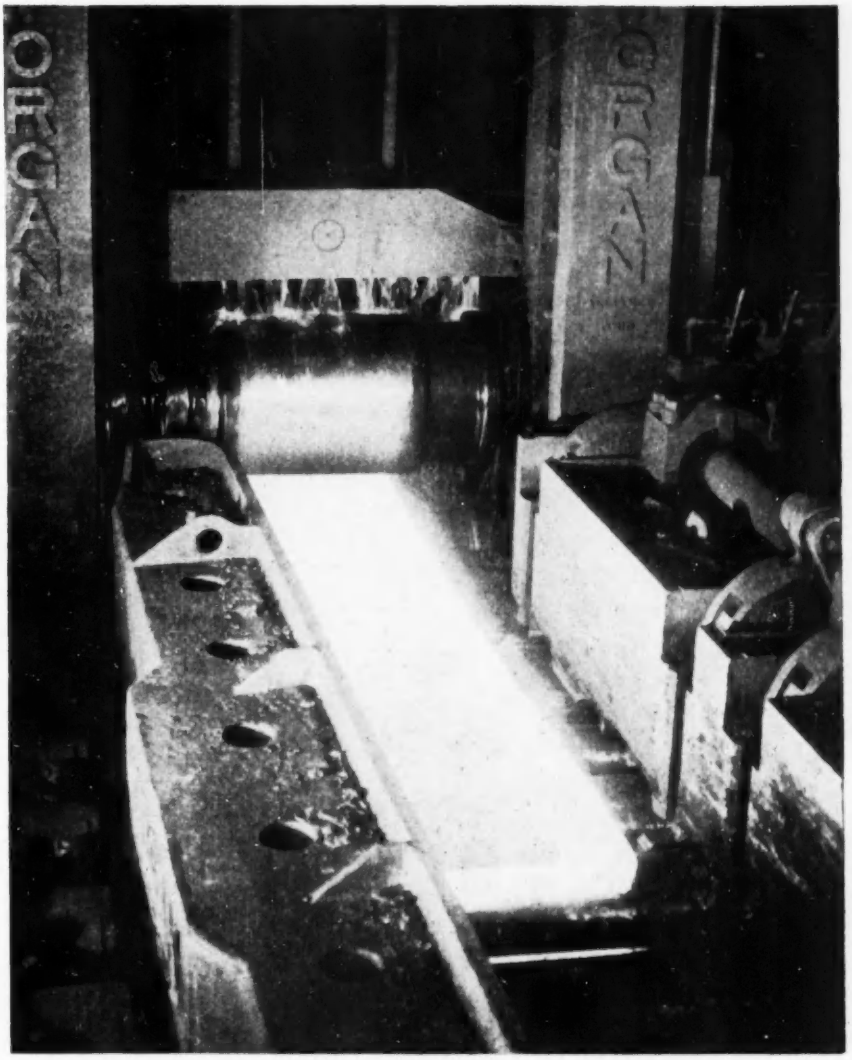
The Uni-Harvestor is another in a long line of new developments by Minneapolis-Moline. The MM emblem means progress in farm machinery but it also means dependability and long life. Because the Donaldson Aluminized-Steel Muffler met these requirements it is now standard equipment on the Uni-Harvestor.

Armored inside and out with aluminum, the Donaldson muffler resists weather, heat and corrosion better than steel alone. It also rates superior in muffling characteristics and it retains its bright appearance over a longer period.

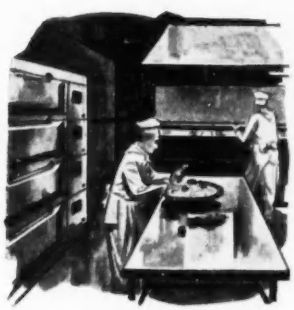
Find out how Donaldson Aluminized-Steel Mufflers can serve your equipment better. Write our engineering department.

DONALDSON COMPANY, INC.
666 Pelham Blvd., St. Paul 14, Minnesota
GRINNELL DIVISION: Grinnell, Iowa
DONALDSON COMPANY (Canada) LTD.,
Chatham, Ontario

Donaldson mufflers



SPECIAL ELECTRICAL ALLOYS



CORROSION and HEAT-RESISTANT STEELS

Warehouse stocks of Allegheny Stainless carried by all Ryerson plants

TOOL and DIE STEELS

Coming at you —

One of the Royal Family of Steel

Our niche in the economic health of this nation in peace, and its defense in war, is to develop and produce the high-alloy steels and other special alloys which will do what ordinary metals cannot even approach in resisting corrosion, heat and wear, and in performing vital electrical and electronic chores. Whenever you have problems in these fields, the place to come is **Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.**

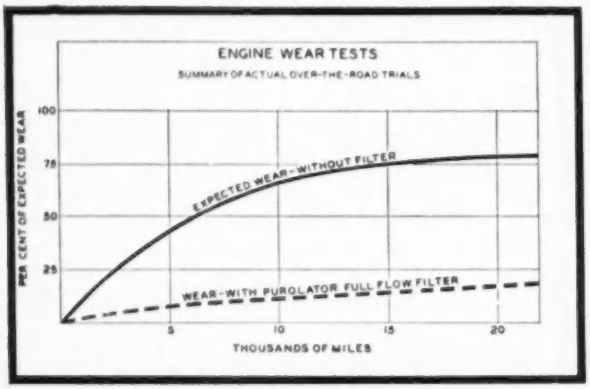
PIONEER in Specialloy Steels

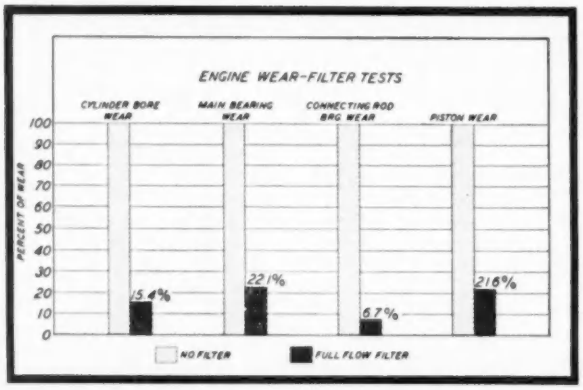
Allegheny Ludlum

AL
TIME-TESTED STAINLESS STEEL

W&D 4092 B

Why leading automotive manufacturers say—





It's *Purolator** for Full-Flow!

In the charts above, you see summaries of important filter research programs, conducted independently by *two* of the world's largest automobile and truck manufacturers.

These were exhaustive investigations, taking several years to complete, in which virtually every available type and make of filter were tested.

What were the results? *Purolator filters out-performed all others by a significant margin.* In severe over-the-road tests of trucks and passenger cars, Purolator Full-Flow filters held engine wear to such an amazing minimum that often it was unmeasurable . . . while control vehicles *without* filters had to have complete engine overhauls.

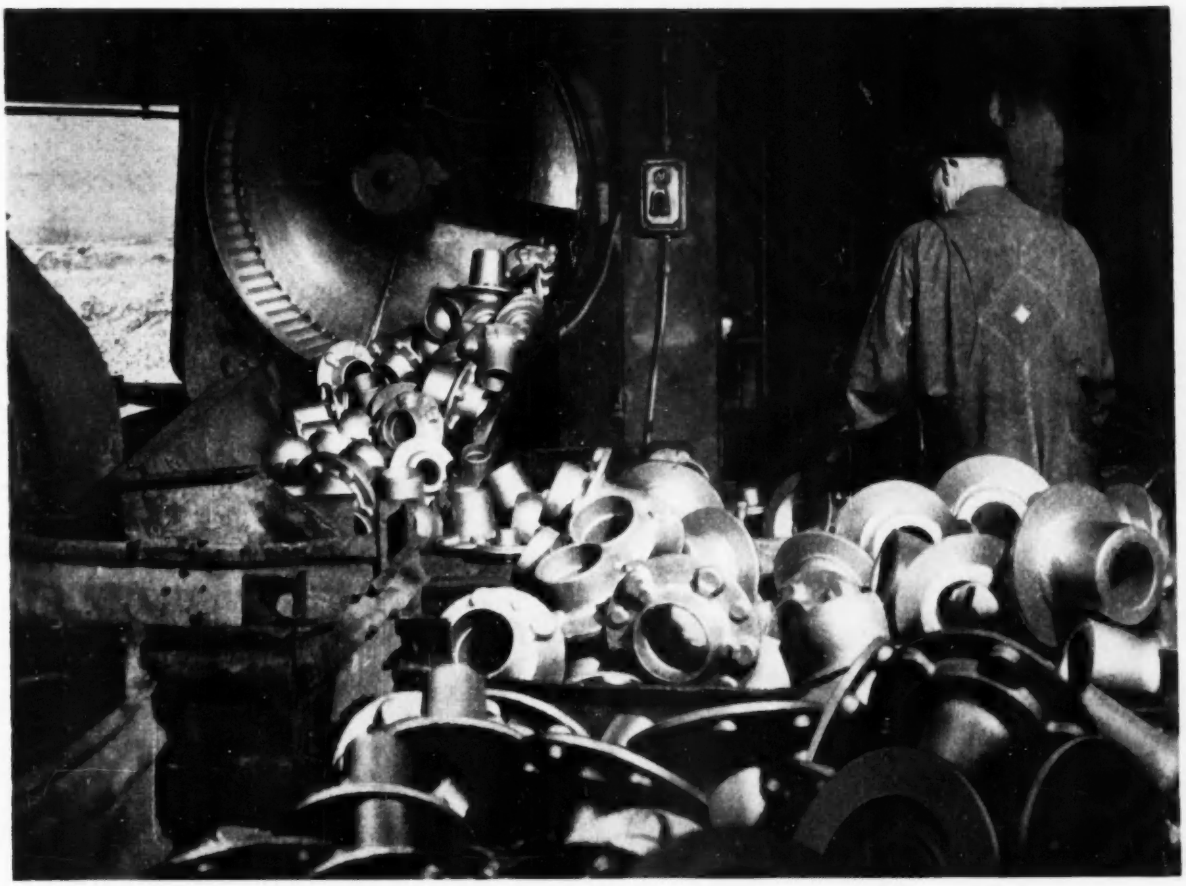
In many other comparative tests, *conducted by vehicle and engine manufacturers themselves,* Purolator filters have been proved best . . . in fineness of filtration (.0000039 in.), in filtering area, in dirt storage capacity and in durability.

If you want further proof of Purolator's superiority, why not make your *own* tests . . . in your own way . . . under your own conditions? Purolator's Engineering Department will gladly co-operate in helping you adapt modern, super-efficient Purolator Full-Flow filtration to your own requirements.

*Reg. U. S. Pat. Off.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices: Chicago, Detroit, Los Angeles

PUROLATOR
WORLD'S FINEST OIL FILTER



Pangborn "Continuous-Flo" Barrel Cuts Blast Cleaning Costs More Than Half!

"Before and After" at Lefere

	FORMER METHOD	ROTOBLAST
Cost of equipment	$50,000 plus	$29,670 total
Operating cost per ton	$1.25	60c
Quality of job	Mediocre	Good
Appearance	Dull	Sparkling
Safety	Fumes, acid hazard	No hazards
Convenience	Problem of protection, acid disposal	No problems
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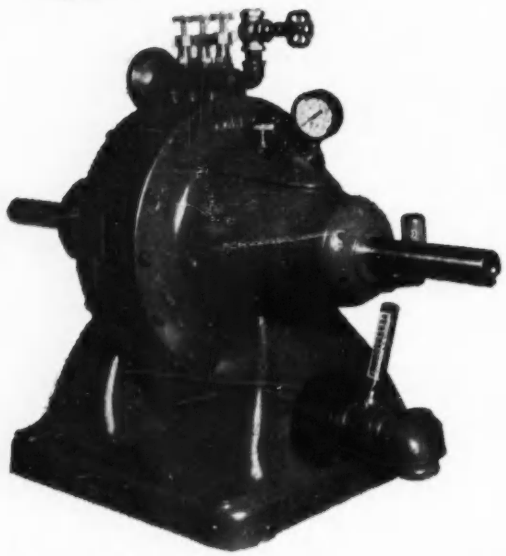

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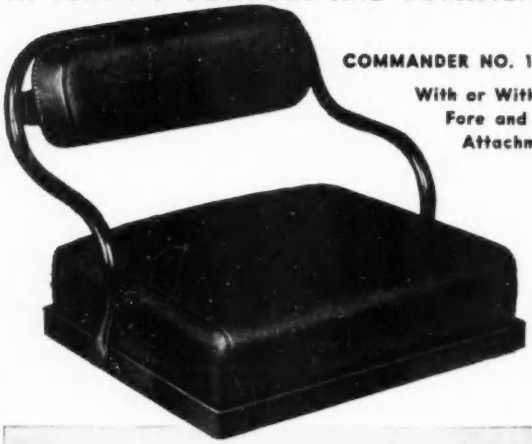

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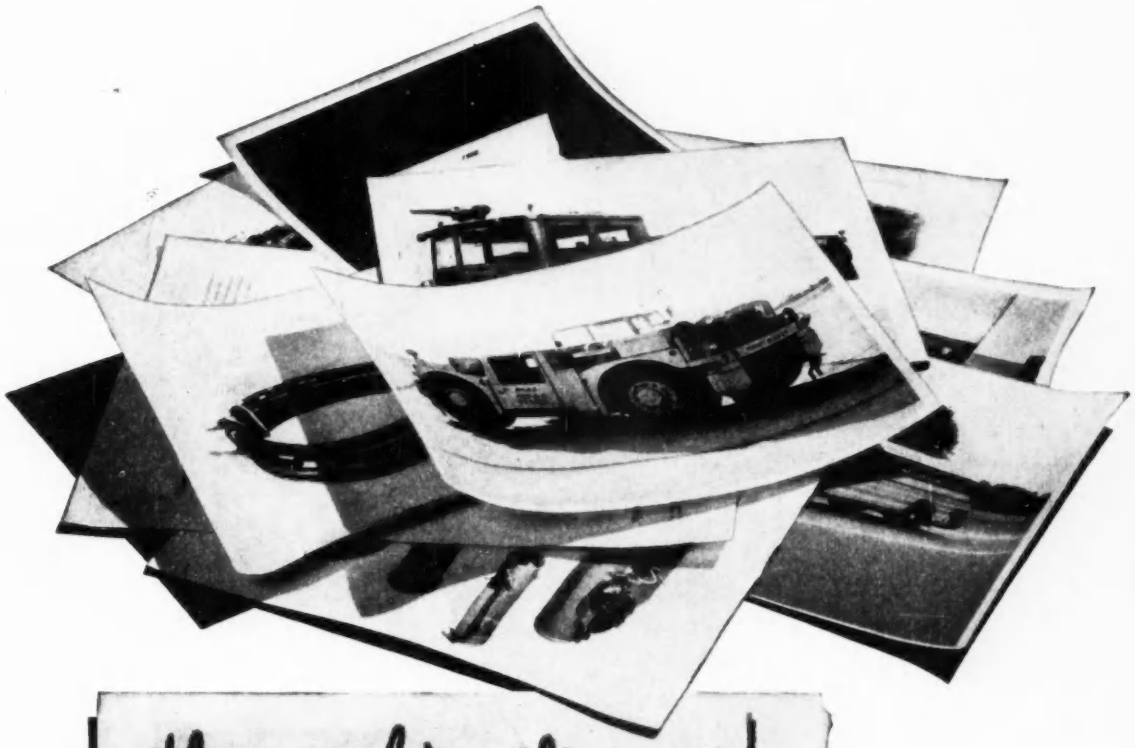

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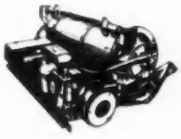

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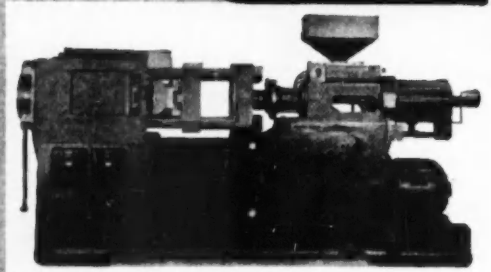

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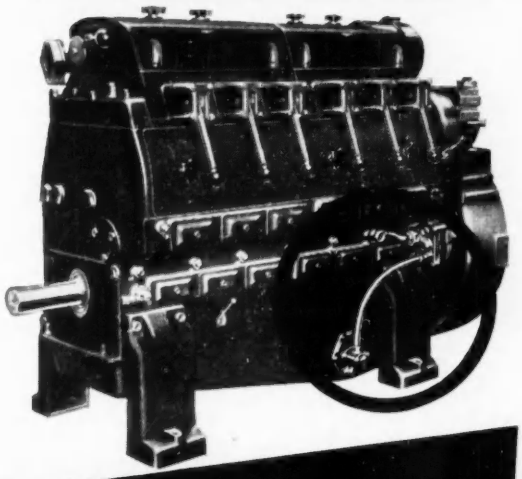

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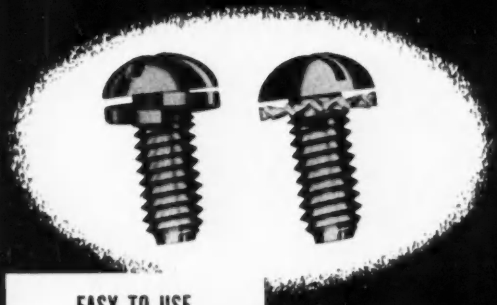

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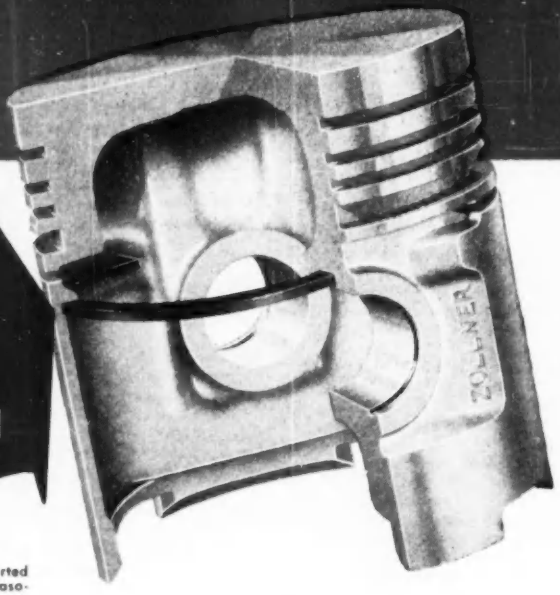

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